



EARTH
SCIENCES
LIBRARY



THE LIBRARY
OF
THE UNIVERSITY
OF CALIFORNIA

PRESENTED BY
PROF. CHARLES A. KOFOID AND
MRS. PRUDENCE W. KOFOID

THE ZONAL-BELT HYPOTHESIS

A NEW EXPLANATION OF THE CAUSE
OF THE ICE AGES

BY
JOSEPH T. WHEELER



PHILADELPHIA & LONDON
J. B. LIPPINCOTT COMPANY

1908

COPYRIGHT, 1908
By JOSEPH T. WHEELER

Published November, 1908

*Printed by J. B. Lippincott Company
The Washington Square Press, Philadelphia, U. S. A*

PREFACE

IT is purposed in this work to show that a vast amount of evidence exists which proves that throughout the geological ages up to recent time our earth was girt with belts of planetesimal or gaseous matter.

The nature of the evidence demonstrates that these belts were potent factors in producing the climatic changes which marked the various geologic periods. They were the cause of the Ice ages. Primitive man saw the last remnants of these strange sights in the sky, and the echo of his thought in the form of mythology has sounded down through the lapse of the centuries.

Facts cannot be ignored. Agassiz demonstrated that the till and boulder deposits scattered over the mantle rock of northern Europe and North America were the product of glacier action, but though the fact of the existence of great continental ice-sheets was established, the cause has remained up to the present date a scientific mystery.

Now, in presenting the belted-canopy or zonal-ring hypothesis the cause or causes which brought them into existence is of secondary importance. The all-important matter is to establish their actuality. Nevertheless, in order to present the argument in a consecutive form, the author undertakes in the opening chapters to show how the belts could have been brought into existence. This portion of the work, however, may be considered as merely tentative, and if he has failed in this particular, it in nowise compromises the main issue.

This is not the first time that an hypothesis somewhat similar to the one about to be launched has been subjected to

the critical eye of the investigator. In fact, there have been several. Briefly, the history of the growth of the idea is as follows:

To Emanuel Kant, who lived some hundred and fifty years ago, belongs the distinction of being the first modern scientist to entertain the thought that this earth was at one time girt about with rings or belts similar to those which now surround our sister planet, Saturn. Kant, however, after due deliberation, cast the idea from him as not worthy of serious consideration.¹

There was nothing in particular new about this conception. The Chaldeans, Egyptians, and Hebrews held that this earth was a flat disk canopied by a vaulted arc or water-sky, the firmament of the Scriptures. Not that the substance of the vaulted arc was actually water, but that this was the appearance of things to the ancients. Because the theory of a vaulted firmament retarded the progress of astronomy, it was dropped entirely. But the question is, How could such a theory have originated and become general throughout the earth without a prototype? Certainly it must have had some legitimate ancestor, and the myths and hero-tales that have come down to us are the vibrations from this far distant age. The present hypothesis deals with the prehistoric. Where it comes into more intimate relationship with the past, it is because of the echo which vibrates in and through the language, relics, literature, etc., of the ancients. The rediscovery of the lost phenomena has been very gradual.

Perhaps in this connection the theories of Ignatius Donnelly are deserving of mention. In his work entitled, "Ragnarok: The Age of Fire and Gravel," this author builds a superstructure of sand on a rock foundation. To say that the origin of drift and gravel is unknown, and further to suggest that they are the débris from the wreck

¹ Kant's *Cosmology*, pp. 129-131.

of a comet, is too radical. Yet in spite of this absurdity there is a fascination that arises from the residuum of truth. The fossil thought of the by-gone days cannot be ignored, and Donnelly has collected and jumbled together a large number of these stories from the myths of many people, which plainly indicate that they were witnesses of some strange sights in the sky. There must have been some common source for these tales.

Again, a similar work was published in 1885, entitled "Paradise Found: The Cradle of the Human Race at the North Pole." Its author was William F. Warren, S.T.D., LL.D., President of Boston University. Lenormant's testimony² is in the same direction, and it goes to show that the Chaldean, Persian, and Indian traditions all point to the northern mountains as the original home of the Caucasian race, therefore conditions in that region must have been very different from those now existing. Comparative religion indicates the same conclusions.

The above works bring together large masses of fact and fable which in some cases, it must be admitted, are grotesque and visionary. They are mentioned in this place, however, as they bear on the history of the development of the present hypothesis. Speculations such as are introduced by these authors must have some foundation. The north seems to have been much warmer in the past. Indeed, zonal atmospheric temperature belts have existed up to recent times. Briefly, the facts of arctic paleontology have induced the belief that there was a primitive Eocene continent in the highest latitudes. The purely scientific aspect of the question is presented in G. Hilton Scribner's monograph, "Where Did Life Begin?" Professor Heer of Zürich and Baron Nordenskjöld both arrived at the same conclusion. J. Starkie Gardner has reviewed the evidence and has stated that this continuous

² "Ancient History of the East and Beginnings of History."

land which once united Europe with North America was probably submerged by the ocean along with northern Asia in late glacial or post-glacial time.³

Since the historic and mythological evidence shows that many minds have had an insight into some portion of the features connected with the zonal atmospheric climatic belts, it is only surprising that Emanuel Kant's suggestion was not followed up long ago. It is true that geologists of the old school, who believed that the earth cooled from a molten state, postulated some form of cloud-blanket. Dana mentions the Astral æon, as it was called, when a heavy, vaporous envelope containing the future waters of the globe or its dissociated elements, and other heavy vapors and gases, was supposed to compass the earth.⁴ But that was in its early history. Isaac N. Vail seems to have been the first to advance the idea that conditions somewhat similar to these could have continued until recent time. His argument runs as follows:

“Our earth once had a Saturn-like system of rings, which in their progressive fall became canopies, such as the planets Saturn and Jupiter have now; that these canopies, acting as a greenhouse roof, made all the warm ages of geologic time, and, gravitating to the polar regions, fell largely as snows, making all the glacial epochs and all the ages the earth ever had.”⁵

In the light of modern science the suggestion of the old school geologists, and the further statement of Professor Vail, that these rings were composed of aqueous and metallic matter sent up from the molten earth, do not bear scrutiny.

³ Professor G. Frederick Wright, “Geology and the Deluge,” *McClure's Magazine*, June, 1901.

⁴ *Manual of Geology*, 4th ed., p. 440.

⁵ Isaac N. Vail, “The Waters Above the Firmament,” “The Deluge and its Cause,” “Eden's Flaming Sword,” etc., etc., Pasadena, Cal. Captain R. Kelso Carter, C.E., a friend of Professor Vail, has published a work on the same subject, entitled “Alpha and Omega.”

It has been proved that Saturn's rings would disrupt if they were composed of aqueous solutions, and, again, the idea that the earth has formed from a fire-mist or heated nebula has given way to Chamberlin's Planetesimal Hypothesis. Vail deserves great credit, however, for the vast amount of mythology which he has interpreted.

All this goes to show that some form of belted canopy must have existed. Perhaps the next best hypothesis comes from Marsden Manson.⁶ His is a scientific presentation of an atmospheric cloud canopy. If to this he had added belts or zones situated on the outer confines of the earth's gaseous envelope, the hypothesis about to be introduced might have used the same for a foundation, and it would have been necessary only to postulate that the said belts were visible, and that they continued as a feature in the heavens until recent time, geologically speaking. It is purposed to expand these ideas, and further to connect these belts with the Planetesimal Hypothesis.

A brief knowledge of the ground covered by this last hypothesis is essential to a clear understanding of the idea that zonal belts once girt our planet, and the following comparison of the nebular and planetesimal hypotheses will supply that need.

"The old hypothesis assumes the existence of a mass of incandescent vapor, with or without a nucleus, which by condensation and rotation was differentiated into successive rings; the latter being eventually gathered up into the planets *while still retaining intense heat*. From this postulate there necessarily follows the conception of a cooling earth; and hypogeic geology has been founded on the idea of crustal solidification on a molten globe. The new hypothesis holds that the disseminated planet-forming matter *had lost its heat*

⁶ See articles in the *American Geologist*; also pamphlet, "The Evolution of Climates."

while yet existing in the loose form, as rings or zones or wisps of the parent nebula, and that the globular planets were *formed by the slow accretion or infalling of cold, discrete bodies or particles* ('planetesimals')." ⁷

The zonal belt hypothesis simply takes hold where the above lets go. Since Saturn still has rings of infalling particles there is nothing startling or improbable in the assumption that our earth had the same, up to the close of the last Ice age.

⁷ Extract from the paper of Herman Leroy Fairchild, read at the St. Louis meeting of the Geological Society of America, January 1, 1904, published in the *American Geologist*, vol. xxxiii, No. 2, by courtesy of the Council.

CONTENTS

CHAPTER	PAGE
I. THE HYPOTHESIS.....	11
II. ATMOSPHERIC BELTS.....	17
III. PLANETESIMAL RINGS.....	30
IV. PHYSICAL EFFECTS—GEOLOGIC.....	39
V. PHYSICAL EFFECTS—BIOLOGIC.....	52
VI. DENSITY OF THE ATMOSPHERE AND OTHER PHYSICAL PHENOMENA	65
VII. VICISSITUDES OF CLIMATE.....	75
VIII. EVOLUTION AND DISTRIBUTION.....	89
IX. CAUSE OF THE ICE AGES.....	101
X. SYMPATHETIC FEATURES.....	117
XI. RECENTNESS OF THE LAST STAGES OF THE ICE.....	124
XII. FOSSIL THOUGHT.....	143
XIII. GENESIS	155
XIV. HINDU MYTHS.....	174
XV. BABYLONIAN AND ASSYRIAN MYTHS.....	196
XVI. EGYPTIAN MYTHS.....	219
XVII. MYTHS OF GREECE AND ROME.....	254
XVIII. HERCULES	276
XIX. PLATO'S CONTRIBUTION	297
XX. MYTHS OF THE AMERINDS	308
XXI. RUSSIAN MYTHS	332
XXII. SCANDINAVIAN MYTHS	358
INDEX OF AUTHORS	387
INDEX OF SUBJECTS	391

CHAPTER I

THE HYPOTHESIS

THE narrowness of the range to which temperatures are confined in order to allow life to continue on the earth has prevailed since the beginning of organic existence. This fact has to be considered by all who would investigate the genesis of things mundane. The geologists and biologists never lose sight of it, but it is difficult to reconcile their requirements with the maintenance of the sun's energy. The best reply seems to be that radiant energy is probably the reflex action of the perpetual motion of the ether. This means that there is no cause left for controversy between the mathematicians on the one side and the aforementioned geologists and biologists on the other. Whether this explanation be accepted or not, the fact of the existence of this long time period of comparative slight temperature fluctuation remains.

If it be true that the supply of radiant energy is constant, then a factor must be discovered that from time to time has modified the amount of energy received, a factor capable of punctuating the geological eras. On the other hand, if, as the advocates of the shrinkage hypothesis generally contend, the sun in past ages has been giving out a greater flow of energy, then this same factor is needed in order to mitigate the results. Again, if the gravitational heat of the earth, due to the consolidation of the original planetesimal structure has entered into the question of the maintenance of this narrowness in the range of temperature, then once more this factor will be very useful, as it is necessary to conserve this dissipation.

The factor that best answers the foregoing requirements is a protecting canopy, and such a one is here postulated—a canopy floating high above the present cloud-belt, and

probably outside the existing atmosphere. The evidence connected with this hypothesis will be presented in the succeeding chapters. It is now purposed to consider the nature of the structure and the possible source of its origin.

The evidence will show that this atmospheric protector existed until recent time, and that primitive man lived under its beneficent roof. Furthermore, it was visible to him, for he has recorded the fact on his monuments, and many of the roots from which his archaic languages are derived have their origin in sky scenes. He worshipped the phenomena which he saw, making gods and devils of the various features, handing down to us the substance of his impressions in that form of mythology which portrays the nature myth.

Since the sky-features were visible, it proves that a canopy of uniform texture spreading evenly over the whole earth could not have fulfilled the requirements. Such a blanket has been postulated by many scientists.

Tyndall thus depicts the influence of such an atmospheric appendage on planetary temperature. He says: "Let us now consider for a moment the effect upon the earth's temperature of a shell of olefiant gas, surrounding our planet at a little distance above its surface. The gas would be transparent to the solar rays, allowing them, without sensible hindrance, to reach the earth. Here, however, the luminous heat of the sun would be converted into non-luminous terrestrial heat; at least 26 per cent. of this heat would be intercepted by a layer of gas one inch thick, and in great part returned to the earth. Under such a canopy, trifling as it may appear, and perfectly transparent to the eye, the earth's surface would be maintained at a stifling temperature.

"A few years ago a work possessing great charms of style and ingenuity of reasoning was written to prove that the more distant planets of our system are uninhabitable. Applying the law of inverse squares to their distances from the sun, the diminution of temperature was found to be so great

as to preclude the possibility of human life in the more remote members of the solar system. But in those calculations the influence of an atmospheric envelope was overlooked, and this omission vitiated the entire argument. An atmosphere may act the part of a *barb* to the solar rays, permitting them to reach the earth, but preventing their escape. A layer of air two inches in thickness, saturated with the vapor of sulphuric ether, would offer very little resistance to the passage of the solar rays, but I find that it would cut off fully 35 per cent. of the planetary radiation. It would require no inordinate thickening of the layer of vapor to double this absorption; and it is perfectly evident that, with a protecting envelope of this kind, permitting the heat to enter but preventing its escape, a comfortable temperature might be obtained on the surface of the most distant planet.”¹

As stated above, the envelope of uniform texture does not fulfil the requirements which the evidence about to be produced demands. If visible at all, the monotony of its sameness would have failed to arouse the religious superstitions of early man, hence they would have left no records of it. Again, the continuance of arctic and tropic life shows that climate was differentiated in such a manner as to preclude uniformity.

In explanation of the vagaries of climate which have existed in the past, two alternatives now present themselves. The one is Chamberlin's hypothesis, that the amount of carbon dioxide in the atmosphere itself is responsible for the physical phenomena. The other is that a fractured shell or envelope composed of rings or belts floated above or on the outer bounds of the atmosphere. This latter hypothesis not only accounts for the physical phenomena, but it also explains the origin of the myths we have so often referred to.

The one hypothesis may be as complicated as the other. Chamberlin's requires a fine adjustment between the ocean

¹“Heat a Mode of Motion,” 6th ed., pp. 417-418.

and the atmosphere. Thus the originator of the hypothesis quotes Schloesing's views as follows: "The carbon dioxide of the atmosphere is in equilibrium, not only with the free carbon dioxide absorbed in the sea water, but, through dissociation, with the second equivalent of carbon dioxide in the oceanic bicarbonates. The sum-total of such free and loosely combined carbon dioxide available at present as a possible supply for the atmosphere may be some twenty-five times the present atmospheric content. Schloesing held that any depletion of the atmospheric content would be followed by emanation from the ocean, and any excess acquired by the atmosphere would be followed by oceanic absorption, and hence great changes in the atmospheric content would only be brought about by reducing or increasing the large sum-total of atmospheric and oceanic supply."²

Now, the diffusion of gases in water is a slow process, and it would seem that the supply of carbon dioxide which the ocean would yield to the atmosphere might be far too slow to offset the consumption of the same under certain chemic geologic conditions. This depletion, according to Chamberlin's hypothesis, would bring about an ice age, the location of the main centres of glaciation being determined by the path of cyclonic storms. So far all seems well, but, unfortunately for the hypothesis, it is difficult to account for the return to normal conditions. The restocking of the atmospheric supply from the ocean would be very slow, and a question arises as to whether the evidence does not indicate a more rapid recession, comparatively speaking.

Again, if the cold of the ice ages was due to depletion, then the warmth of the Carboniferous age was due to excess. This amount could not have exceeded a percentage that would allow of the continuance of animal life. "According to Berzelius, common air containing $1/20$ of its volume of

² *Journal of Geology*, vol. xiv, No. 5, p. 367.

carbon dioxide can be breathed without producing any serious effects; but from Angus Smith's later experiments it appears that when air contains only 0.20 per cent. by volume of this gas, its effect in lowering the action of the pulse is rendered evident after the respiration has continued for about an hour. It seems, therefore, premature to say that the smallest increase of the atmospheric carbonic acid may not be productive of hurtful results." ³

But let us examine one of the statements of the author himself. He says: "If we consider what a possible atmosphere and ocean richer in carbon dioxide might do, it seems idle to look to the atmosphere as even a possible competent reservoir, consistently with the life that existed; for the carbon dioxide of the present atmosphere, if converted into limestone, would form a layer about one-thirtieth of an inch thick only, over the globe. To form a layer one foot thick it would have to be increased 360 fold, which would surely imperil active, air-breathing life, unless it were different from similar present life." ⁴

Dropping this line of argument and approaching it from another standpoint, it seems rash to postulate a colder climate as a requisite to an ice age. It takes heat to evaporate water in order to furnish the supply of snow. Belts of carbon dioxide hanging above the atmosphere would have caused remarkable climatic contrasts, and as they would not necessarily have changed the atmospheric content, animal life would not have suffered. The saturated warm air drifting from beneath such a canopy would have been quickly congealed into snow and ice by the cold air in the open zones. Intense cold near the poles during the Ice age is at variance with the recorded facts.

Again reverting to Chamberlin's hypothesis, we find that it is based on the views of Arrhenius regarding the effects

³ Roscoe and Schorlemmer, "Treatise on Chemistry," vol. i, p. 625; Angus Smith, "Air and Rain," p. 209.

⁴ Chamberlin and Salisbury, Geo., vol. ii, p. 661.

on the climate of small changes in the amount of carbon dioxide in the air. Now, his views have been contested by Angström and Very, and are not accepted by Hann. Thus, since the physicists disagree, it may be that the foundation is itself insecure.

The alternate hypothesis which postulates that belts or rings environed the earth may be presented in two forms, or in a combination of the two. The first assumes that their origin was terrestrial, the second that it was planetesimal. The one is atmospheric, the other rises high above it. The first fulfils all requirements, but a possible difficulty exists in connection with the flotation stability of the belts. The density of carbon dioxide compared to air is 1.524, therefore it does not seem likely that this substance entered into their composition. However, as there are numerous other lighter gases which might have answered the purpose, this objection is not serious. Centrifugal force undoubtedly played a conspicuous part, as it was this whirling energy that broke the canopy up into belts. If the rings had their origin beyond the atmosphere, then the forces which control Saturn's system must have sustained ours. In other words, we are presenting two diametrically opposed ideas, the one working outward and the other inward. It may be true that both forms of the hypothesis are correct. There may have been a system of rings composed of planetesimal accretions received from outer space, and there may also have been belts on the outer confines of the atmosphere, somewhat similar to the belts now visible on Jupiter. These belts may have had a volcanic origin, or, again, they may have been derived from the rings, for undoubtedly in falling these became canopies, their substance drifting off in the direction of the poles, where centrifugal force was at a minimum. It is a significant fact that our sister planets present us with an object lesson, and that we do not comprehend the exact working of the laws involved.

CHAPTER II

ATMOSPHERIC BELTS

ACCORDING to the planetesimal hypothesis of the earth's origin, the hydrosphere and atmosphere were acquired through gravitational action driving out the internal gases. This process has gone on from the initial stages to the present time. Every volcanic eruption witnesses large additions, that can be measured, as in the case of explosive vents like that of Mount Pelée, by the standard of cubic miles.¹

The principal gaseous product excluded by volcanoes are water-vapor, carbon dioxide, hydrocarbons, hydrogen, oxygen, and nitrogen. To these may be added chlorine, sulphur, and many other temporary gases, together with certain other light and volatile material. Even at the present day enormous quantities of these products are shot forth into very high altitudes. Witness the eruption of Krakatoa, the powdery dust from which was carried up at least seventeen miles, and the gaseous ejections may have reached still more amazing heights.² Volcanic action in the past has been more active than at present.³ In the case of our sun, protuber-

¹James Furman Kemp, "*Economic Geology*," Dec.-Jan., vol. i, No. 3, pp. 219-220, 229.

²Joseph Le Conte, "*Elements of Geology*," 5th ed., revised by Herman Le Roy Fairchild, p. 91.

³Archibald Geikie describes the following basalt-plain visited on his return trip from the Yellowstone, which illustrates this greater activity of the past. He says: "The last section of our ride proved to be in a geological sense one of the most interesting parts of the whole journey. We found that the older trachytic lavas of the hills had been deeply trenched by lateral valleys, and that all these valleys had a floor of the black basalt that had been poured out as the last of the molten materials from the now extinct volcanoes. There were no visible cones or vents from which these floods of basalt could have

ances are shot out to heights of many thousands of miles. "The expansive potency of this prodigious elasticity," say Chamberlin and Salisbury, "is held in restraint by the equally prodigious power of the sun's gravity." As it is, some of these outshoots closely approach the controlling limit of the sun's gravity.⁴ In the case of our moon, the expansive potency of its volcanoes has been too great to be controlled by its feeble gravity, hence the moon lacks an atmosphere. Now, gravity exerts on our own planet a force much less than that of the sun, and much greater than that of the moon. It is generally admitted that we may have lost a part of our atmosphere, therefore it may be logically surmised that more than one of our outer gaseous shells or envelopes in past time escaped.

The joint authors above cited say in this connection that "the mean velocity of hydrogen is more than four times that

proceeded. We rode for hours by the margin of a vast plain of basalt, stretching southward and westward as far as the eye could reach. It seemed as if the plain had been once a great lake or sea of molten rock which surged along the base of the hills, entering every valley and leaving there a solid floor of bare black stone. We camped on this basalt plain, near some springs of clear cold water which rise close to its edge. Wandering over the bare hummocks of rock, on many of which not a vestige of vegetation had yet taken root, I realized with vividness the truth of an assertion made first by Richthofen, but very generally neglected by geologists, that our modern volcanoes, such as Vesuvius or Etna, present us with by no means the grandest type of volcanic action, but rather belong to a time of failing activity. There have been periods of tremendous volcanic energy, when, instead of escaping from a local vent, like a Vesuvian cone, the lava has found its way to the surface by innumerable fissures opened for it in the solid crust of the globe over thousands of square miles. I felt that the structure of this and the other volcanic plains of the Far West furnish the true key to the history of the basaltic plateaux of Ireland and Scotland, which had been an enigma to me for many years." ("Geological Sketches at Home and Abroad," pp. 237-238.) To this we may add that the explosive type of volcanic eruption was also greater in the past than at present.

⁴Chamberlin and Salisbury, *Geo.*, vol. ii, p. 55.

of oxygen, and it may be assumed that it would be at least four times as liable to escape from the control of the earth.”⁵

If these belts, composed of gases lighter than air, were working outwards, all that is required of them is that they remained under gravitational control long enough to produce the pronounced climatic effects known to biology and to geology.

They may have been invisible to the eye and yet have fulfilled all the requirements of the hero-tales left us by early man, for, although invisible themselves, they would have caused certain phenomena to be introduced into the atmosphere beneath which would have been visible, and this secondary class of phenomena would have given birth to the myths.

The secondary phenomena referred to may be explained as follows: When a column of air saturated with aqueous vapor ascends from the earth it is invisible until radiation or the meeting with cooler currents condenses it. Thus cumuli are the heads of vaporous columns which are precipitated as soon as they reach a certain elevation.⁶ Now, gaseous belts floating on the outer confines of the atmosphere would have prevented this radiation. They would have introduced greenhouse conditions, admitting the luminous heat, and preventing the escape of the dark heat. Aqueous vapor is lighter than air, and the only thing that stops its upward career is this condensation. Under the influence of such belts as are postulated, undoubtedly the present storm belt would have been surmounted by one immeasurably higher, and this stupendous belt of cloud being visible inspired the ancients to worship and to build monuments that have along with the Scriptures perpetuated the memory of the crooked flying serpent.

⁵ *Ibid.*, p. 98.

⁶ Tyndall, “Heat a Mode of Motion,” 6th ed., p. 384.

“By his spirit he hath garnished the heavens; his hand hath formed the crooked serpent.”⁷ The serpent portrayed girded the sky in an east and west direction. The storm-belt, postulated, not only floated at great heights, but also had its boundaries established by the overruling zonal extra-atmosphæra belts, and it follows that it could not extend further north, or further south, than these boundaries.

The greenhouse conditions are thus described by Le Conte: “It seems almost certain that during the whole recorded history of the earth, *i.e.*, during the time it has been inhabited by organisms, the surface-temperature of the earth has been almost wholly due to external causes. Now, the composition of the atmosphere is an external cause, which greatly affects the surface-temperature, but which has hitherto been almost wholly neglected. The thorough explanation of this point will require some discussion of the properties of transparent media in relation to light and heat.

“Many bodies which are transparent to light are opaque to heat. Such bodies, however, will freely transmit heat, if the heat be accompanied with intense light. It is as if the light carried the heat through with it. Heat thus associated with light is sometimes called *light heat*, while that which is not thus associated is called *dark heat*. Now, the bodies spoken of are *transparent* to light heat, but *opaque* to dark heat. Glass is such a body. If a pane of glass be held between the face and the *sun*, the heat passes freely and burns the face, but the same pane would act as a *partial* screen before a *fire*, and as a *perfect* screen before a hot, but not incandescent, *cannon-ball*.

“It is in this way we explain the fact that a glass greenhouse, even in the coldest sunshiny winter’s day, becomes insupportably warm if shut up. The sunlight and heat pass freely through the glass and heat the ground, the benches,

⁷ Job xxvi: 13.

the flower-pots; but the light-heat thereby becomes converted into dark heat, and thus is *imprisoned* within. Now, the *earth and its atmosphere are such a greenhouse*. The light-heat passes readily through, warms the ground, changes into dark heat, and is in a measure imprisoned by the partial opacity of the atmosphere to this kind of heat. The atmosphere is a kind of blanket put about the earth to keep it warm. So much has long been recognized. But Tyndall has shown that the property of opacity to dark heat in the case of the atmosphere is due wholly to the small quantity of carbonic acid and aqueous vapor present; that oxygen and nitrogen are transparent to dark heat, and, therefore, if the atmosphere consisted only of those two gases, it would not be heated by radiation from the earth, and the ground would lose all its heat by radiation during the night, and become intensely cold, like space. In other words, the blanket put about the earth to keep it warm is woven of carbonic acid and aqueous vapor.”⁸

The matter resolves itself into the question, What gases of light density would exert a similar influence? Langley says: “The temperature of this planet, and with it the existence not only of the human race but of all organized life on the globe, appears, in the light of the conclusions reached by the Mount Whitney expedition, to depend far less on the direct solar heat than on the hitherto too little regarded quality of selective absorption in our atmosphere.”⁹

Geology and biology unveil the fact that in the past the earth has been at times a vast orchard-house blooming with a luxuriant vegetation that has even extended to the polar regions.

“We know by experiment,” remarks Sir Charles Lyell, “that plants which are natives of the tropics can dispense

⁸ Geo., 5th ed., revised by Fairchild, pp. 395-396.

⁹ George F. Barker, “Physics,” 4th ed., p. 393.

more easily with the bright light of those countries than with the heat of the same. Few palms can live in our temperate latitudes without protection from the cold; but when placed in hot-houses they grow luxuriantly, even under a cloudy sky and where much light is intercepted by the glass and framework. At St. Petersburg, in lat. 60° N., many tropical plants have been successfully cultivated in hot-houses, although there they must exchange the perpetual equinox of their native regions for days and nights which are alternately protracted to nineteen hours and shortened to five. How much farther towards the pole even the existing species might continue to live, provided a due quantity of heat and moisture were supplied, has not yet been determined; but St. Petersburg is probably not the utmost limit, and we should expect that in lat. 65° at least, where they would never remain twenty-four hours without enjoying the sun's light, they might still exist." ¹⁰

Greenhouse conditions have existed in the past all the way up to the pole, thus all these facts go to show that a canopy exerting a selective absorption must have existed. Pure hydrogen, though light enough to float above the atmosphere, was not the material out of which this blanket was made, for its atoms, apparently, are quite incompetent to stop the calorific waves. But there are other gases, such as argon, krypton, neon, helium, and their combinations, which have to be considered. Some of the hydrocarbons likewise, which also are products of vulcanism, and which have a relatively high power of absorption, cannot be ignored.

The radiation-enigmas of the boreal auroras have recently been identified with the spectra of some of the new atmospheric gases. This indicates that remnants of the old canopy still exist. This phenomenon often takes the form of an arc from which stream curtains of light.

¹⁰ "Principles of Geology," vol. i, 11th ed., p. 226.

There is a possibility that these rarefied belts may have been upheld by electrical expulsion originating in the earth, in which case they may have been heavier than air. Centrifugal force also was a very powerful factor, the rate of gyration being the same or slightly slower than the earth.

One matter is certain, the gaseous envelope could not have been of uniform texture. The physical evidence as recorded by the zonal climatic temperatures and the records of primitive man unite against such a supposition. In other words, it was broken up into belts or rings, and, furthermore, the laws of mathematics, mechanics, and physics demand that it should be.

It is not unlikely that electricity alone would have caused such a break up. Biela's comet separated into two parts, mutually affecting each other.¹¹ Though this comparison may have but little value, it does, however, introduce a possible factor. Yet why deal with uncertainties, since this feature is so clearly proved?

Thus it is plain to all that the power of gravity being at least partially neutralized by centrifugal tendency due to axial speed, allowed the latter to gain progressively in lifting capacity from the poles, where that speed had a zero value, to the equator, where it attained the maximum. Here, then, the gaseous materials of the rotating body were virtually lighter than elsewhere, and consequently retreated farther from the earth. Not only did this introduce strains into the canopy itself, which probably disrupted it, but it also caused an unevenness in the height to which the ascending columns of aqueous vapor could rise. This is all important, for since the canopy quite probably was invisible, it makes little difference whether it was ruptured or not. The fact to grasp is that the secondary cloud uplift was visible,

¹¹ Agnes M. Clerke, "History of Astronomy During the Nineteenth Century," 3d ed., p. 120.

and this, owing to these physical conditions, must have been divided into serpent-like belts.

It must not be inferred because of the use of the word "rupture" that the upper belt which we are considering was of one piece. Such a structure is impossible. Our conception makes every individual particle independent, but liberty is not license, and when these individuals transgressed the law of their station they were to all intents and purposes ruptured from it.

Even under existing conditions signs are not wanting that point to the existence of belts in the heights of our atmosphere. Twenty miles above the earth's surface there is a stupendous wind blowing which completes its circuit in about thirteen days. The great explosion of Krakatoa, which took place August 27, 1883, revealed to us its existence. Through the medium of the dust from this eruption it was seen that this mighty wind circled around the earth in the vicinity of the Equator. Afterwards the dust dissipated as a canopy drifting towards the poles. Those who saw the brilliant sunsets tinged by these particles will never forget them. Krakatoa certainly thundered forth its voice as a witness to this hypothesis.¹²

This is not the only instance in recent time when the dust from volcanoes and from arid regions has revealed these upper air-currents. The following are given as illustrations: "This phenomenon is frequent on the northwest of Africa, about the Cape Verde Islands, in the Mediterranean, and over the bordering countries. A microscopic examination of this dust by Ehrenberg led him to the belief that it contains numerous diatoms of South American species; and he inferred that a dust-cloud must be swimming in the atmosphere, carried forward by continuous currents of air in the

¹² James D. Dana, "Manual of Geo.," 4th ed., pp. 163, 291. Archibald Geikie, Geo., 3d ed., pp. 214, 338.

region of the trade-winds and anti-trades, but suffering partial and periodical deviations. But much of the dust seems to come from the sandy plains and desiccated pools of the north of Africa. Daubrée recognized in 1865 some of the Sahara sand which fell in the Canary Islands. On the coast of Italy a film of sandy clay identical with that from parts of the Libyan desert is occasionally found on windows after rain. In the middle of the last century an area of northern Italy, estimated at about 200 square leagues, was covered with a layer of dust which in some places reached a depth of one inch. In 1846 the Sahara dust reached Lyons, and it is said to have been since detected as far as Boulogne-sur-Mer. Should the travelling dust encounter a cooler temperature, it may be brought to the ground by snow, as has happened in the north of Italy, and more notably in the east and southeast of Russia, where the snows are sometimes rendered dirty by the dust raised by winds on the Caspian steppes. It is easy to see how widespread deposits of dust may arise, mingled with the soil of the land and with the silt and sand of lakes, rivers, or the sea; and how the minuter organisms of tropical regions may thus come to be preserved in the same formations with the terrestrial or marine organisms of temperate latitudes.”¹³

This kind of evidence may be somewhat tiresome, but it is very suggestive, for since dust can be suspended in the atmosphere, as now constituted, and carried to such great distances, a little reflection shows what a potent factor it must have been in the by-gone ages. In those days this same dust must have been sucked up, along with the water-vapor, to very great heights, where it was held in suspension for correspondingly long periods. A few more instances may be pardoned:

“M. Stanislas Meunier, the well-known authority upon

¹³ Archibald Geikie, *Geo.*, 3d ed., p. 337.

meteorological effects, gives an account of a phenomenon which occurred at Paris and which was no doubt caused by the eruption of Vesuvius. On the morning of the 11th of April a dry and yellowish fog extended over the city. It was strong enough to interfere with the navigation on the Seine, and the sun appeared under a peculiar aspect. Supposing that this phenomenon might be caused by the eruption of Vesuvius, M. Meunier placed upon the roof of his dwelling a series of plates covered with glycerine, so as to retain the floating dust. These plates when treated with water gave a rather abundant deposit in which soot and organic matter were visible to the naked eye. The fine portion of the deposit, which was separated by the Thoulet heavy liquid, gave an extremely fine sand, and a microscopic examination of this confirmed M. Meunier's idea.

“Comparison of this sand with the ash sent up by Vesuvius in 1822, of which he had a sample, showed a complete identity with the latter. The main difference consists in the presence of some perfectly spherical globules of oxidized iron in the Paris dust. We may therefore admit that the fog seen in Paris was caused by the very fine dust sent up from Vesuvius.”¹⁴

Tyndall says: “Ashes have been shot through the lower current by volcanoes, and, from the places where they have subsequently fallen, the direction of the wind which carried them has been inferred. Professor Dove, who has so enriched the knowledge of the age by his researches in meteorology, cites the following instance: ‘On the night of April 30 explosions like those of heavy artillery were heard at Barbadoes, so that the garrison at Fort St. Anne remained all night under arms. On May 1, at daybreak, the eastern portion of the horizon appeared clear, while the rest of the firmament was covered by a black cloud, which soon extended to the

¹⁴ *Scientific American*, vol. xcv, No. 13.

east, quenched the light there, and at length produced a darkness so intense that the windows in the rooms could not be discerned. A shower of ashes descended. Whence came these ashes? From the direction of the wind, we should infer that they came from the Azores; they came, however, from the volcano Morne Garou in St. Vincent, which lies about 100 miles west of Barbadoes. The ashes had been cast into the current by the upper trade. A second example of the same kind occurred on January 20, 1835. On the 24th and 25th the sun was darkened in Jamaica by a shower of fine ashes, which had been discharged from the mountain Coseguina, distant 800 miles. The people learned in this way that the explosions previously heard were not those of artillery. These ashes could only have been carried by the upper current, as Jamaica lies northeast from the mountain. The same eruption gives also a beautiful proof that the ascending air-current divides itself above, for ashes fell upon the ship *Conway*, in the Pacific, at a distance of 700 miles southwest of Coseguina.' " ¹⁵

Another class of phenomena which points to the existence of belts in the upper confines of the atmosphere is the aurora polaris.

It is a most interesting fact that these displays have a tendency to follow local time, as though they were in some way connected with an invisible belt whose rotation period was in harmony with that of the earth's. Thus in the great aurora of February 4, 1872, which was visible in both hemispheres, it had its maximum at about the same local time, between 8.30 and 9.30 P.M., and not at the same physical instant.¹⁶

A common appearance of the aurora is that of parallel arches or curtains of light, always running from east to west

¹⁵ "Heat a Mode of Motion," 6th ed., pp. 209-210.

¹⁶ Frank Wilbert Stokes, *Century Magazine*, Feb., 1903, vol. lxx, No. 4.

or from west to east—a significant fact, for as electric phenomena depend upon a material surface on which to accumulate, and as the aurora is generally acknowledged to be of electrical origin, it proves the existence of invisible belts in our modern atmosphere.

It is said of these arcs that “in certain regions, and probably also at certain epochs, the polar aurora manifests itself simply as a very regular arc of a circle, with well-defined outlines and uniformly luminous in all its parts, so that it presents an absolutely homogeneous texture. It is under this form that the aurora borealis most often presented itself to Professor Nordenskjöld in 1878–79, during the celebrated wintering of the *Vega* on the northern coast of Siberia, almost at the entrance to Behring Strait. In this station the summit of the arc rarely exceeded a height of thirty degrees above the horizon, so that its centre remained well below the horizon.

“These arcs are generally completely motionless and remarkably permanent: they often retain their position for hours and even for several days.”¹⁷

Now, unquestionably these belts or rivers flow above the cloud-zone. Thus the aurora furnishes still another valuable idea. It gives certain data regarding the height of these gaseous belts. Floegel deduces the following conclusions: “The altitude of the base of the rays is very variable; it is usually comprised between 150 and 250 kilometres (93 to 155 miles), but its extreme limits attain perhaps 100 and 300 kilometres (62 and 186 miles). As to the summits of the rays, they often reach a greater height than 500 kilometres (310 miles); it is even probable that they pass 750 kilometres (565 miles); but they appear never to reach 1,500 kilometres (930 miles).”¹⁸

¹⁷ Alfred Angot, “The Aurora Borealis,” The International Scientific Series, pp. 20–21.

¹⁸ *Ibid.*, p. 59.

It is said also that these displays may be in part connected with the presence of ferruginous dust derived from the disintegration of meteoric masses or from volcanic eruptions.

As canopies are subject to the laws of centrifugal force, which becomes of zero value at the poles, it follows that there always has been an open place in the sky in those zones. In this connection any invisible series of belts existing to-day would also be outlawed from the far north. This feature is indicated by the aurora and is thus described in the *Century* article from which we have already drawn:

“Contrary to received opinion, the auroras do not increase as we advance poleward; for in the regions where polar expeditions have mostly wintered, Melville Island, Baffin Bay, and Smith Sound, the aurora is generally less brilliant and also less frequent than in Iceland, Labrador, and South Greenland. Its maximum of frequency is at North Cape, Nova Zembla, and at Cape Chelyuskin, Siberia—cutting the meridian of Behring Strait at latitude 70° , entering America a little to the west of Barrow Strait, crossing Hudson Bay and Labrador, passing to the south of Greenland and Iceland, and forming an oval zone which has for its centre a point situated between the geographical and magnetic poles. The latter is situated in Boothia Felix Land, in latitude 73° north and 98° west longitude from Paris.”¹⁹

An objection may arise in the minds of some to the effect that if the arc of the aurora reveals belts in the upper atmospheric gases, then since these arcs are often elliptical rather than circular, the belts assume a form not reconcilable with the expected conditions. This may be true, but whether the conditions are such as we picture in our minds or not, the fact remains, Saturn’s ring system is elliptical.²⁰

¹⁹ Vol. lxxv, No. 4, Feb., 1903, p. 495.

²⁰ Agnes M. Clerke, “History of Astronomy in the Nineteenth Century,” 3d ed., pt. ii, chap. viii, p. 364.

CHAPTER III

PLANETESIMAL RINGS

It is a vast step from Jupiter-like belts to rings such as circle Saturn, and yet there are features that are common to both. Rings composed of planetesimal bodies riding at immense heights may have caused a secondary cloud system in the atmosphere, or, again, in falling, these rings may have themselves formed canopies. Be this as it may, Saturn has Jupiter-like belts. Since these marvels exist, it will be well to glance at certain of the conditions which they introduce, and the laws which they are forced to obey, with the object of showing that it is quite possible that our earth once had such a system.

To begin with, as the force exerted by gravity on our earth is not much greater than on Saturn, conditions similar to those now prevailing on that body may have existed on our globe. Thus a falling body on our sphere passes through a space of sixteen feet during the first second of its journey. On Saturn in the polar regions it would cover seventeen and five-tenths of a foot, but at the equator, owing to the increased velocity of rotation, the force is lessened one-sixth, therefore the falling body would travel only fourteen and eight-tenths feet in the first second.

Mathematical calculations (Kepler's Third Law) require the rings in the case of our earth to have been about 2,200 miles from the surface in order to maintain their stability.

It is known that our sister planet has belts as well as rings. This is a very important point. An annular system such as Saturn's, taken by itself, would not have influenced the climate of our planet in such a way as to mark the contrasts required by the geological ages. For this reason it

is obvious that a secondary cloud system is necessary. Again, though it is true that the upper system itself, if it continued as a feature in the sky until man appeared on the earth, would have impressed itself upon his imagination and religious instinct so vividly that it would have contributed largely to his primitive nature myths, yet the secondary canopy system is needed to round out this record.

Taking the primary system into consideration, if we could travel over the surface of the planet Saturn to-day, we would find that from the pole as far as the 63d degree of latitude the great annular system would be invisible. Advancing toward the equator, the arches would begin to rise above the distant horizon more and more. It would be only during the two seasons, spring and summer, that the face of the rings would turn toward the hemisphere where we would be standing. Their appearance at night would be that of a bright bow reflecting the light from the sun, but in day-time probably only a feeble light, analogous to that of our moon when seen in broad daylight, would be visible.

In mean latitudes, of say 45° , the several series of nearly concentric rings would be viewed sideways. We would see three principal rings and several minor subdivisions, separated by certain well-defined spaces. Under the equator, glancing up at the zenith, we would be looking only at the thin interior edge. It would be ribbon-like in appearance, for, according to the evidence derived from the breadth of the shadow cast on the planet, the rings are only sixty miles thick.

As to the height of these wonderful appendages of our sister planet, the inner or "crape" ring, also known as the "gauze" ring, begins at a distance of some 6,400 miles from the surface of the planet and extends upward to about 8,400 miles. This first ring merges by imperceptible gradations into another circle which is some 18,000 miles wide. Then comes an interval of about 1,450 miles, known as "Cassini's division"; after which follows the outer ring, some 10,000

miles wide, whose exterior edge is approximately 43,000 miles distant from the surface of the planet.

The substance of the crape ring is now generally admitted to be a cloud of cosmical dust, similar to the cloud that causes the phenomenon of the zodiacal light. "The disk of Saturn is seen through this ring in undiminished brightness, and in May, 1905, Saturn's satellite Iapetus passed bodily through it. The circumstances and consequences of this passage proved that the gauze ring is composed of separate particles, which are either smaller or less closely aggregated than those which form the outer rings."¹

As the rings draw nearer to the planet, increased collisions probably account for the finer character of the dust, the dashing together of the particles reducing them to a condition which when they finally fall into the upper strata of the atmosphere would result in their immediate combustion, the gases resulting spreading out and forming the canopy.²

There is a close relationship between meteoric dust and the aurora polaris. "According to this view, the light of the aurora is caused by clouds of ferruginous meteoric dust, which is ignited by friction with the atmosphere. Groneman has shown that these might be arranged along the magnetic curves by action of the earth's magnetic force during their descent, and that their influence might produce the observed magnetic disturbances. . . . The correspondences with iron lines in its spectrum are sufficiently close to favor the idea. Ferruginous particles have been found in the dust of

¹ *Illustrierte Zeitung*, and *Scientific American Supplements*, Nos. 192, 1600.

² It is well to emphasize the fact that the gaseous nature of the canopy is derived from combustion, and that no part of it comes in the aëriiform fluid condition directly from the rings. The water-sky of the ancients was of secondary origin, the water, or rather the vapor, being derived from the surface of the earth itself. As no refraction is visible upon the limb of the planet seen through the gauze ring, it follows that the ring itself is not gaseous.

the Polar regions, but whether they are derived from stellar space or from volcanic eruption is uncertain.”³

The geographical distribution of the fall of meteorites indicates that they have been whirling for some time in belts before finally reaching the earth. This of course does not apply to the shooting stars, which, coming from a stationary radiant point in upper inter-planetary space, are usually consumed in our atmosphere. With regard to the former class, a prediction was made by Dr. Oliver C. Farrington in the *Popular Science Monthly* in February, 1904,⁴ in the following words. He said: “It is usual to dismiss inquiries regarding the meaning of such groupings with the remark that they are mere coincidences. But it is the mission of science to investigate coincidences, and however long the task may be of determining the laws which bring about the particular occurrences here referred to, there can be no doubt that they are the result of law, and of law which will some day be discerned by the human mind.”

If a few meteorites can make a belt of sufficient density to give rise to the auroral phenomenon, naturally great things should result from the consumption of a ring of such material. Saturn’s rings are falling. “Since 1657, when Huygens described the interval between the ring and the planet as rather exceeding the width of the ring, it is all but certain that a growth inward has actually occurred. For the two bright rings together, instead of being narrower than the interval, are now more than one and a half times as broad. Hence the expressions used by Huygens, no less than most of the old drawings, are glaringly inconsistent with the planet’s present appearance.”⁵

³ Encyclopædia Britannica, 9th ed., article on the aurora.

⁴ Vol. lxiv, No. 4, p. 354.

⁵ Agnes M. Clerke, “History of Astronomy During the Nineteenth Century,” 3d ed., pt. ii, chap. viii, p. 366.

Infalling material naturally drifts towards the poles where centrifugal force is annulled, therefore since Saturn's rings to-day are falling and are forming a canopy, and it is not reasonable to suppose that another process of nature in the past originated the blankets now seen on Jupiter, Venus, and Mars, and that our earth was garnished by one of these appendages derived in some other way.

In our last chapter a volcanic origin was suggested as a possibility, but the fact remains. It is altogether improbable that projectiles from terrestrial volcanoes ever received impulses powerful enough to enable them not only to surmount the earth's gravity, but also to penetrate its atmosphere. In order to meet this difficulty we were forced to postulate gases lighter than air, but the present assumption of an infalling ring system accounts for the heavier-than-air gases, such as carbon dioxide, riding on top. There is a certain class of meteorites that are carbonaceous.

As to the origin of the material which formed the rings, the meteoric hypothesis meets with little favor, for the distribution of meteorites through space is too sparse. The planetesimal hypothesis assumes a cold spiral nebula, out of which the solar system has evolved, but long ages ago, it is believed, inter-planetary space was swept clean of the dusty material. A question arises—Could this supply in any way have been replenished?

It is generally supposed that the nebulae, from which the stellar systems are derived, are rendered luminous by virtue of the continually recurring contacts of their various particles. It is highly probable that in space there exists a far larger number of invisible nebulae than visible, for the reason that the number of contacts in a system of lighter texture would be so few that their existence would not be made known. Our sun is continually rushing into new fields, and the suggestion is made that in some past age, geologically speaking, not so very long ago, he ran into one of these minor

dark nebulae.⁶ This would have replenished the interplanetary dust, and the velocities and distribution of such particles would have lent themselves to the formation of just such annular systems, as that which has passed away from our own earth, and those now visible in the final or canopy stage on Venus and Jupiter, and which still survives on the planet Saturn. These show us, not how the worlds were made, but how the geologic ages were separated by the planetesimal-ring clock.

It must be understood that whether the nebula into which our finished solar system plunged was a gaseous spheroid or one arising from an aggregation of meteors, matters not, the important factor being that this newly acquired material conformed to the general law of such systems, revolving in concentric orbits about its common centre, which was no doubt captivated by our sun. The several constituent parts must have been attracted towards the different planets, around which they must have first revolved as a nebulous satellite, but, owing to their disrupted condition, they no doubt soon trailed out into a characteristic ring formation.

The joint authors of Chamberlin's and Salisbury's Geology grant that "the rings of Saturn may have been satellite nuclei at the outset, and have been drawn within the Roche limit by the growth of Saturn, and then disintegrated by tidal action and distributed into the ring form."⁷

Other methods of acquiring satellites also exist. "This possibility, it now seems, has been actually realized. The identification of Brooks's with Lexell's comet is due to the acumen of Dr. Chandler. He found that the former body had spent eight months in 1886 under Jupiter's immediate control—had, in fact, barely escaped being reduced to the

⁶ The suggestion that the sun ran into a nebulous region is somewhat similar to that hypothesis, advanced to account for the Ice age, which pictures certain regions in space as colder than others.

⁷ Vol. ii, p. 63.

position of his satellite—and had issued from the proximity with all the elements of its motion turned, so to speak, topsy-turvy.”⁸

If annular systems have been acquired as suggested, it follows that their period of rotation would not at the first have been likely to conform to that of their adopted primary. Tidal retardations would in time adjust these differences, but in the beginning this added initial impulse derived from their original system would have tended to float them high in the heavens of their new relative.

Jupiter to this day furnishes us with evidence of this nature. “The time of rotation of the red spot is not the same as that of the adjacent cloud-forms. In 1890 a large spot was moving directly toward the red spot; but it was diverted from its course, and passed at one side of the spot. After it passed by it did not return to its original course, but remained at the higher latitude into which it had been shunted; it passed the red spot at the rate of twenty miles an hour. Professor Keeler has likened the great red spot to a sand-bank in a river, past which the flecks of foam go scurrying.”⁹

In Jupiter’s case, the true globe has never been seen, so the period of rotation is unknown, though the red spot may represent some mighty physical disturbance near the surface. But this does not seem likely, for even this wonderful feature is itself subject to a changing rate of rotation. With one or two exceptions, the vapor-cloud currents are pretty constant, their normal speed conforming closely to the general movement of the latitude in which they circle.

As regards the relative altitudes of the various markings, observation tends to show that the more swiftly moving objects are situated at a greater height than those which jour-

⁸ “History of Astronomy During the Nineteenth Century,” 3d ed., p. 445.

⁹ Herbert A. Howe, “A Study of the Sky,” p. 255.

ney more slowly. According to the conditions outlined in our last chapter, this is just what should be expected. In Jupiter's case, an invisible gaseous canopy surrounds the planet, the lower system of cloud-belts being lifted to heights far above the natural storm zone by the inability of these vaporous masses to radiate their heat through the greenhouse roof. They are aided somewhat in their upward tendency by two causes: first, as already mentioned, aqueous vapor, being lighter than air, would always reach greater heights than it does were it not due to condensation resulting from the above-mentioned radiation; second, the great ocean of gas, or rather planetesimals, resting above the clouds, exerts a certain well defined gravitational pull.

The equatorial belts observed in Jupiter's canopy are probably composed of ring material not yet reduced to the gaseous form by the oxidizing agency of the atmosphere.

Returning to the problem of axial rotation, we have seen that atmospheric retardation in the case of Jupiter's cloud-belts has reduced the speed of the lower members of the system. The opposite characteristic, however, prevails in the case of ring systems. Thus Keeler demonstrated by means of the light waves received from opposite sides of Saturn's rings, that they rotate, but the most marvelous part of his spectroscopic work is the point established, that the interior part of the rings rotate faster than the outside.

The following rotation periods are very suggestive: The inner edge of the bright ring, 7 hours and 45 minutes. The inner edge of the innermost or crape ring, 5 hours 39 minutes. The mean time of the rings as a whole, however, is 10 hours and 29 minutes, which is somewhat longer than that of the planet itself. The atmospheric canopy of Saturn does not rotate as fast as the planet itself, and, moreover, different streams or belts have relative motion with respect to their surroundings.

If satellites and annular systems have been acquired as postulated, we should expect to find instances where tidal action has not yet brought about a perfect harmony. The most prominent examples are found in the satellites of Uranus and Neptune, which have a retrograde rotation from east to west, a fact of which neither Kant nor Laplace had been aware. Another striking instance is that of Phobos, one of Mars' moons, which is the only known case of a satellite circulating faster than its primary rotates.

"Jupiter's innermost moon conforms in its motions strictly, and indeed inevitably, to the plane of his equatorial protuberance, following, however, a sensibly elliptical path. Its very insignificance raises the suspicion that it may not prove solitary. Possibly it belongs to a zone peopled by asteroidal satellites. More than fifteen thousand such small bodies could be furnished out of the materials of a single full-sized satellite spoiled in the making."¹⁰

¹⁰ "A Popular History of Astronomy During the Nineteenth Century," 3d ed., chap. viii, pp. 357-358.

CHAPTER IV

PHYSICAL EFFECTS—GEOLOGIC

THE new factors introduced by this hypothesis throw fresh light on many mooted questions. In this chapter it is purposed to glance at some of these; namely, tidal action, planetesimal deposits, and the division of the geologic periods by the great annular time-clock.

Taking these up in the above order, first we have the matter of the earth's rotation affected by these conditions, and we find two very important factors diametrically opposed to each other. The contraction of the loosely compacted planetesimal world matter, on the one hand, has increased our planet's rate of rotation, thus shortening the day, while on the other hand, the tidal brake is to be credited with the prevention of an excessive gain of this speed.

A doubt arises as to how long the moon has been responsible for this tidal restraint. The fact is, most of the elaborate calculations of the mathematicians are based on a terrestrial birth and gradual withdrawal of our satellite. Yet this birth and withdrawal itself may be questioned. Thus astronomers tell us: "It is not unlikely that the satellites of Jupiter, Saturn, or Mars (we may safely add, of Uranus or Neptune) never revolved in much narrower orbits than those they now traverse; it is practically certain that they did not, like our moon, originate very near the *present* surfaces of their primaries."¹

It is very strange if nature provided two different methods for the birth of these children of the planets. Plainly the

¹ Agnes M. Clerke, "A Popular History of Astronomy During the Nineteenth Century," 3d ed., pt. ii, chap. ix, p. 387. Phil. Trans., vol. clxxii, p. 530.

trouble with this whole proposition is that it is founded on the old version of the nebula hypothesis.

Now, turning to the new interpretation, the moon-zones or rings out of which all the satellites of the planets were formed according to the planetesimal hypothesis had a gravitational but not a tidal effect on their primaries. Take the case of our earth. In opposition to terrestrial gravity the contrary attraction of the annular system must have lifted immense bodies of water in the equatorial regions. Again, these rings attracted each other. As some of the inner rings fell they acted as a partial release to the outer or moon-zone ring, allowing it to drift off farther and farther into space; hence the late birth of the moon tends to ratify the inference that we had a regular annular system. The grinding down of axial velocity and the expanding of orbital range were greatly retarded by the annular system.

In fact, the above is the only tenable hypothesis advanced to explain the birth of our satellite. The break-up of the primeval planet into two masses as a consequence of a too rapid rotation is open to the objection that the lesser mass would have been entirely disrupted. After this catastrophe these broken remnants necessarily had to reunite. Why introduce into the proposition two elements of uncertainty when one is more than sufficient?

We remarked that the above is the only tenable hypothesis advanced to explain the origin of our moon, but it may be well to qualify this remark with the suggestion that perhaps when our sun picked up the unknown system in stellar space, our moon was already a developed member of that community. According to this view, other satellites may have been added to our mundane system, which, however, became disrupted, thus forming the rings postulated.

But to return to the proposition that our moon was not born from, or rather torn from, our semi-molten earth,—which, to begin with, assumes a condition of earthly things

which we cannot admit ever existed,—the best authorities concurring in this opinion.

“Mr. James Nolan of Victoria has made it clear that the moon could not have subsisted as a continuous mass under the powerful disruptive strain which would have acted upon it when revolving almost in contact with the present surface of the earth; and Professor Darwin, admitting the objection, concedes to our satellite, in its initial stage, the alternative form of a flock of meteorites. But such a congregation must have been quickly dispersed, by tidal action, into a meteoric ring. The same investigator fixed 6500 miles from centre to centre as the minimum distance at which the moon could have revolved in its entirety.”²

If the moon had its origin from the terrestrial spheroid, then the period of critical instability that brought about its birth occurred long æons before the geologic time-clock began to lay down its divisions of rock. Keeping this in mind, if the moon is to be credited with being the chief agency in developing oceanic tides, then it follows from these two propositions that the earliest geologic ages should have seen the highest tides. Now, the geological record shows that very high tides occurred in the Triassic period of Mesozoic time; if the moon were so close as to raise these tides during the Reptilian age, then the whole harmony of a gradual withdrawal outward on its long spiral journey is upset. The first part of the trip would have been unreasonably slow and the last portion at an unthinkable speed; therefore we are forced to the conclusion that the moon was born at too late a date to allow of the thought that it was separated intact from its primary.

At first sight it would appear that there is no connection between gravitational action on the part of the belt system and geologic divisions of rock and of time, but there is.

² *Ibid*, pt. ii, chap. viii, p. 386.

Take, for example, the fact that this pull exerted by the rings was uniform around the circumference of the earth. It follows that there was no tidal action due to this cause, but there must have been a great uplift of the waters of the ocean under these appendages.

Astronomers and physicists claim that the earth is a stable body more rigid than steel, and they are extremely skeptical of the claims of the geologists that involve vast terrestrial uplifts, for they argue, if the earth were less rigid, the enormous united tidal influences of the sun and moon would cause waves of flexure to travel around the globe as ocean tides do, and these agencies would be powerful enough to have a disrupting influence.

Now, the idea which we advance relative to the uplift of the waters of the ocean under the annular appendages does much to reconcile these views. It is not necessary to suppose that the earth is as plastic as is generally claimed by the geologists, nor on the other do we have to admit the stability of the rigid condition required by the astronomers and physicists. The evidence shows that as we descend from the earth's surface we enter a zone where owing to the augmented heat rocks would be in a state of flowage were it not for the increased gravitational pressure. Below this region the pressure controls the situation. Now, the critical region is rigid so long as it remains under control, but the shifting of the oceanic weights has from time to time upset these stable conditions and introduced the plastic.

Since the annular system was subject to certain periodic and also perhaps to erratic oscillations, it follows that the heaped up waters must from time to time have been forced to shift. This calls to mind the old 'waves of translation.' In the early days of geological theory one hypothesis advanced the idea that in some manner a series of gigantic waves were propagated in the far north. These mysterious movements were styled 'waves of translation.' James Geikie says, "It

was unfortunate for this view that it violated at the very outset the first principles of the science, by assuming the former existence of a cause which there was little in nature to warrant.”³

Perhaps the old hypothesis is not so bad after all, though the direction of the inundation should be reversed.

Shoal water did exist at the poles, as is witnessed by the land bridges, by means of which the flora and fauna migrated from one continental plain to the other, and also by the buried river channels, firths, and fiords. It is generally admitted by all but the astronomers and physicists that the weight of the great continental ice sheets caused the settling of the land masses, and that the vast accumulation of this same ice also lent a gravitational pull that tended to draw the oceanic waters towards the north; but in addition to these reasons there certainly is no objection to admitting a third cause which logically accompanies them. To wit, when the canopy passed away the uplifted waters in the equatorial regions sought their level. The canopy, as we shall see in a future chapter, was the direct cause of the ice ages.

Le Conte is authority for the statement that “at the same time, partly by subsidence, and therefore slackened water-currents, and partly by moderated climate and melting of glaciers, there was a flooded condition of rivers and lakes in Middle Europe, France, Germany, and Switzerland. At the same time, also, the northern portion of Asia and the lake-region of that continent were submerged. The Caspian Sea, Lake Aral, and other lakes in that region were probably then united into one great inland sea, connecting either with the Black Sea or the then greatly-extended Arctic Ocean, or with both.”⁴

³ “The Great Ice Age,” 3d ed., chap. iii, p. 26.

⁴ Elements of Geo., 5th ed., p. 596. Nature, vol. xiii, p. 74. *Natural History Magazine*, vol. xvii, p. 176. Archives des Science, vol. liv, p. 427.

Going back in geological time to yet earlier ages, G. Frederick Wright says: "Coming down from the neighborhood of the White Mountains, the Adirondacks, and the Archæan highlands of Canada, sediment-laden streams have, from the earliest geological ages, been engaged in wearing away the hills, scooping out the valleys, and silting up the sea. The Alleghany Mountains were at one time the bed of the ocean upon which this sediment was deposited. The sandstones, shales, and conglomerates of the coal-measures attest the activity of the forces of that early period. The tops of the mountains in southern New York and northern and eastern Pennsylvania are covered with subcarboniferous conglomerates of almost incredible depth and extent, consisting largely of well-rounded quartz pebbles, of all sizes up to two or three inches in diameter. These are water-worn, and must have been rolled along by impetuous currents from far-distant regions." ⁵

The size of these deposits is indeed incredible, and the tremendous currents required for their assortment are indeed a puzzle. The key to the situation is found in the warmth of the carbonic climate, and this key when turned in the lock reveals a greenhouse-roof-canopy that not only piled the waters up in a heap but also furnished the materials for the coal plants and the limestones of that era.

In connection with the possible aerial origin of some of the above deposits, H. L. Fairchild makes the following suggestions, which show that geologists are ready to admit the extra-terrestrial origin of certain deposits. "With the passing of the old hypothesis," he says, "it will be desirable to change the terminology of the rocks as far as this now implies an original molten or 'igneous' state of the earth. Some new name will be desirable for the sediments which were formed chiefly or wholly from planetesimals (the cosmic

⁵ "The Ice Age in North America," 4th ed., chap. xii, pp. 268-269.

matter) in the early seas of the growing globe. Let us call such deposits *cosmoclastics*, and the primitive massive rocks, the *cosmics*. The downward succession of the rocks would thus be from unaltered clastics through altered clastics (metamorphics) to metamorphosed cosmoclastics; while beneath these, perhaps ever invisible, lie the altered cosmics, the primitive deposits.”⁶

Naturally any ring stuff which may have been added to the earth as late as the Carboniferous cannot be expected to show forth its origin as clearly as the formations of the archæozoic, for the reason that decomposition of the loose clastic material was greatly enhanced by the luxuriant vegetal growth in the former era.

Fairchild distinctly points out that the detritus which formed the sandstones, shales, and conglomerates was not all due to the wearing away of earlier formations. He remarks: “The nebular hypothesis requires that the globe should have been fully formed before the surface or epigene agencies began their work, and that all the vast deposits of fragmental origin, the clastic rocks, have been wholly derived from the primitive land areas by rock destruction. The new hypothesis allows a different view. According to this, the ocean began its work long before the earth and moon had attained full size by gathering to themselves all the particles of the earth-moon ring or zone. Consequently, there were oceanic sediments which were not wholly detrital, but were primitive world-stuff. The earlier ocean sediments must have been deeply buried under the later, and may now constitute part of the interior mass of the globe.”⁷

Even archæology testifies to strange, loosely shifting material which may be in part the wind blown remnants of cosmical world chaff. Thus in connection with Bel’s sanc-

⁶ *American Geologist*, vol. xxxiii, No. 2, p. 101.

⁷ *Ibid*, p. 100.

tuary at Nippur, Herman V. Hilprecht says: "In descending into the pre-Sargonic period below Narâm-Sin's pavement, which itself lies six to eight feet above the present level of the desert, Haynes penetrated through more than thirty feet of ruins before he reached the virgin soil, or thirty-five feet before he was at the water level. What do these ruins contain? To what period of human history do they lead us? How was this great accumulation beneath the level of the desert possible? What geological changes have taken place since to explain this remarkable phenomenon? Such and other similar questions may have come to many thoughtful students when they first read these extraordinary facts."⁸

Ignatius Donnelly imagined the earth covered with the fragments from the wreck of a comet. Natural phenomena, however, connected with the every-day physical forces, explain the origin of all of these deposits, but though they may be explained, it does not follow that some of them, in part at least, may not owe their origin to the ring-belt system. In other words, it's time to break away from the time-honored but antiquated principle of Charles Lyell, that geological evidence excludes the thought of catastrophic changes. Thus the late Joseph Prestwich contended for a comparatively recent submergence of western Europe and the Mediterranean coasts.⁹ The distribution of rubble-drift was one of his strong lines of argument. Rubble-drift hardly answers the requirements, but Prestwich also mentions the widespread formations of the loess. In almost all parts of the

⁸ "Explorations in Bible Lands During the Nineteenth Century," p. 391.

⁹ Articles on this subject may be found in the following publications: "On the Raised Beaches and 'Head' or Rubble-drift of the South of England, etc.," *Quart. Journ. Geol. Society*, vol. xlviii, p. 263; "On the Evidences of a Submergence of Western Europe and of the Mediterranean Coasts at the close of the Glacial Period," etc., *Phil. Trans.*, for 1893.

world this peculiar deposit is found. Several theories have been proposed to account for it, but none are satisfactory. It appears to be associated with the ground-up materials from the glaciers and to have been rearranged by fluvial and eolian processes. The fossil content belongs to the land. Dust from the belts may readily enter in part into its composition. By far the largest percentage of meteoric material which reaches this earth is in dust form. However, we are not forced to accept the statement that all the material precipitated from the belts was consumed to powder before reaching terra firma, for if larger bodies did fall it follows that they would have been quickly reduced in the mill of the glaciers and the extreme weather conditions to which they were exposed. Prestwich also remarks the red breccia which covers the hills of southern Europe.

The conclusion arrived at is that no distinctive deposit can be found that owes its origin wholly to the belts, for the reason that from the beginning such material was loose and scattered, and therefore subjected to the most rigorous of the disintegrating processes.

Though it is impossible at this time to identify any of the superficial *débris* as planetesimal dust, yet some of the old views regarding these depositions are in this connection of rare interest. For instance, Sir. J. W. Dawson says of them:

“The deposits of the mammoth age, and it would seem of the reindeer age as well, are covered with beds of yellow earth, brick earth, and earth with angular stones, which antedate the later stone age and bronze age. These deposits constitute the ordinary soil of the country, and at all levels, and they are evidently of the same nature with the superficial gravels, soils, and loess to be found resting on the pleistocene deposits everywhere in the northern hemisphere, and which have poured into the old caverns of the Palæocosmic age. They are not to be confounded with the ordinary glacial

deposits which in northern districts underlie them. They are not river deposits, because no possible extension of the river beds could overflow the places where they lie, or bring the stones from very distant localities which the gravels often contain. They prove as Howorth, the Duke of Argyll, and the writer have argued, that at the close of the Palæocosmic age a deluge of water swept over our continents and caused the physical break between the earlier and later human ages. This great cataclysm was preceded, in Europe at least, by a gradual refrigeration and a progressive extinction of the larger animals, and was followed by a diminished size of the continents, and by the advent over the depopulated surface of a more limited fauna and a new race of men. That it must have been this great cataclysm which has fixed itself in the traditions of all races of men as the historical deluge, we can scarcely doubt.”¹⁰

Before the facts of the stupendous work done in the ice ages were generally understood, certain phenomena which have since been attributed to this agency were given other interpretations. Thus the loess was called “inundation mud,” and perhaps the idea was not so very wrong after all. It was known to have covered much of Europe and of Asia, and inasmuch as G. Frederick Wright has found evidence of a very extensive recent submergence in this latter continent,¹¹ the old idea gains new credence. The Duke of Argyll says:

“On the continent of Europe, too, we know that a large part of its central area is occupied by a formation (the ‘loess’) which Lyell calls ‘inundation mud,’ and which he designates as the last and latest of all the great formations known to geology. The difficulty of accounting for it is proved by the number of theories which have been pro-

¹⁰ “Modern Science in Bible Lands,” chap. iii, pp. 137-138.

¹¹ *American Geologist*, vol. v, No. 3, p. 182. *McClure's*, June, 1901.

pounded. The shells in this formation are not fluviatile, nor are they lacustrine. On the other hand, they are not marine. They are terrestrial. They are land shells—the shells of damp woods or morasses—in short, of a land surface which has been covered with this ‘inundation mud.’ One possible explanation is obvious. The sea establishes its own forms of life where itself is established for any length of time. But if its invasion of any land area be not lasting, but temporary, it may fail to carry its mere dead shells over that area, whilst its living fauna would not have had time to grow.”¹²

Having outlined the powerful influence that the gravitational pull of the annular system exerted, it is next proposed, as set forth in the opening statement of this chapter, to show how these inundations and the climatic changes brought about by the canopy itself may be likened to a great annular time-clock, dividing the geological periods from each other.

Every one knows that a geological clock would be a very convenient thing, an instrument that would assure the investigator that the same time divisions were synchronous in all localities. It is manifest to a greater or less extent that such an instrument has existed throughout the geological ages. The present hypothesis reveals the clock, its workings, and the method by which we may ascertain the striking of the hours.

It is a significant fact that even the subordinate groups of a formation are almost as definitely marked off in the same order, the world over, as the major terranes themselves. This is true not only of the stratigraphic arrangement, but also of the fossil content. Why, it might be asked, could not a migration have occurred backwards from one continent to the other, the Silurian fauna being imposed upon the

¹² Article by Argyll in the *Contemporary Review*.

Devonian, for instance? Clearly there was some hindering and controlling cause that made the conditions nearly uniform throughout the world, and there can be no doubt that even the minor subdivisions were practically synchronous or contemporaneous. The singular uniformity of the lithological record, moreover, indicates that this controlling cause was more than physical; it was material.

It is postulated that a separate fall marked the end of each geological age, and to a lesser extent subsidiary falls punctuated each era, period, and epoch. These falls were not, generally speaking, catastrophic, but were gradual. Take that which marked the Ice age. Large quantities of snow and ice, no doubt, fell from the upper cloud belt itself. Not only must this fall have been long drawn out, but the resulting glaciers also protracted the time by locking in their icy chain such hordes that the heat of centuries was not sufficient to melt them.

In chapter three it was stated that it was possible that the earth's annular system was picked up from new sweepings derived from the cosmical dust of a minor or dark nebula into whose territory our solar system had plunged. It is established, however, from the evidence of the time clock, that our system has survived from the dawn of geological phenomena. Following inevitable law, ring after ring has broken away from the equatorial system, has spread out and formed canopies, only to be eventually claimed by the earth. It follows from this order that between the fall of each separate ring there was probably a time of clear skies, except for the ribbon-like edge of the disks which spanned the zenith at the equator.

The fact of these clear skies is very important to the present hypothesis because the existence of exogenous trees, growing by annular rings added to the outside, as early as Devonian time, proves the action of alternating seasons of summer and winter, and hence a solar climate. Again,

since it is purposed to show that the last remnant of the ring system did not pass away until after civilized man appeared on the earth, it is necessary that he could have seen the clear sky, for otherwise the early records which he has left us would be violated, as they contain accurate descriptions of solar and stellar phenomena.

In the *American Geologist* of February, 1904,¹³ attention is called to a twisted form of stem exhibited by certain shallow-water monticuliporoids of the lower Silurian, which Sardeson interprets as possibly due to heliotropism, and hence an indication of direct sunlight. The article goes on to state that "if these indications of early solar climate can be explained conformably with Mr. Manson's theory, or a modification of it, certainly a most serious obstacle will be overcome." Now, in our preface Manson's theory was mentioned as a scientific presentation of an atmospheric cloud-canopy. Here where it is lacking, the hypothesis under consideration is strong. Open skies did exist for a large part of the time.

¹³ Vol. xxxiii, No. 2, p. 120; vol. xxvii, p. 388.

CHAPTER V

PHYSICAL EFFECTS—BIOLOGIC

"THE very limited number of generic forms that pass from one major formation to another is remarkable. Barande enumerates but seven of the twenty-seven Cambrian genera which pass over into the Silurian, and twelve of the fifty-five Silurian genera which reappear in the Devonian. The Carboniferous genera are but three or four in number (Phillipsia, Griffithides, Brachymetopus, Proetus). Of the fifty-five Silurian genera, with three exceptions, all the forms are already represented in the lower division. The number of genera that extend through two or more formations is reduced to two or three (Phillipsia, Proetus)." ¹

Rutherford has aptly said: "Since the different forms of life found in the successive geological strata indicate the stages of evolution, it is evident that the biological and geological clock is the same, and that whatever time is required for the changes in the one science must be conceded by the other." ²

As a canopy fell a geological age ended, and with it its life conditions. In course of time a second and originally a higher ring descended, forming another canopy, with its resultant new world environment and with its new life conditions admitting of a higher order. These in turn gave way to similar falls and to successive marches of still other rings and canopies across the ephemeral sky. Thus the record is written, and the facts are for our investigation. In the succeeding chapters it is purposed to show that the new

¹ Angelo Heilprin, "The Geographical and Geological Distribution of Animals," International Scientific Series, pt. iii, chap. i, p. 277.

² *Harper's Monthly*, Feb., 1905, p. 390.

physical conditions introduced by annular phenomena are responsible for these deaths, and that they also are potent factors in causing the surviving species to mutate. Finally the geographical distribution of the flora and fauna will be shown to have taken place in accord with the new hypothesis.

The fact of the imperfection of the geological and biological record demonstrates the catastrophic nature of the end of the age changes. Had these occurred by gradual stages, the missing links would be wanting, that is, if life had developed along the lines of the Darwinian School. But there are missing links, as every one knows, and each one of these links means a catastrophe of some nature. Each succeeding geological age had its own development, which, though it was a continuation in part of the preceding age, nevertheless had distinctive peculiarities, due to climate, absorption of light and heat rays, weight of the atmosphere, etc. Probably also the waters were at times impregnated and the air vitiated.

To begin with, as Darwin himself showed, the intervals that elapsed between consecutive formations were usually much longer than the formations themselves. Angelo Heilprin says: "It must be admitted that there are certain anomalies connected with the occurrence of breaks which have not thus far received an adequate explanation. Their broad distribution—it might, indeed, almost be said universality—in equivalent periods of time, has long been noted as a surprising fact, and one that still remains in the nature of a puzzle to the geologist. Nowhere on the surface of the earth has there as yet been found a distinct connection between the Paleozoic and Mesozoic series of deposits, and only at a very few points (India, New Zealand, California) what may be considered to be an unequivocal link between the Mesozoic and Cainozoic series (Cretaceous and Tertiary)." ³

³ "The Geographical and Geological Distribution of Animals," p. 193.

This is as it should be, for only during a period of change were the forces of nature fully awakened, and the general character of these changes was the natural result of a shift or alteration in a system that environed the world. Secondary results followed immediately, and these in turn frequently followed others. Thus the violent shifting of the oceanic waters as pictured in our last chapter must have induced sympathetic volcanic action. Illustrations of all kinds are plentiful. The Arctic mammoth luxuriating in polar pastures were overwhelmed suddenly and placed in cold storage with undigested food in the stomach.

Elephant Point, Alaska, is famous as the locality where Kotzebue found remains of the fossil elephant, ox, and other mammals. Its bluffs are said to be composed of tough blue clay, light loose soil, bones, and solid ice. These cliffs are sometimes fifty feet thick, and extend for two miles east and west. "The smell of these ice cliffs," says Dr. Tarleton H. Bean, "resembles that of a stable or something worse." "The old Russians living in Siberia were of opinion that the mammoth was an animal of the same kind as the elephant, and that Siberia had been warmer before the Flood than now, and elephants had then lived in numbers there; that they had been drowned in the Flood, and afterwards, when the climate became colder, had frozen in the river mud."⁴ The question as to the origin of this graveyard is easily explained by the present hypothesis.

Looking back at some of the early ages, the same record of sudden death confronts us. Even Lyell, who always emphasized gradual development along ultra conservative lines, cannot help recognizing this feature. He says:

"It has been remarked, and truly, that many fish and saurians, found fossil in the Lias, must have met with sudden death and immediate burial; and that the destructive

⁴Nordenskjöld, "Voyage of the Vega," p. 305.

operation, whatever may have been its nature, was often repeated.

“ ‘ Sometimes,’ says Dr. Buckland, ‘ scarcely a single bone or scale has been removed from the place it occupied during life; which could not have happened had the uncovered bodies of these saurians been left, even for a few hours, exposed to putrefaction, and to the attacks of fishes and other smaller animals at the bottom of the sea.’ Not only are the skeletons of the Ichthyosaurs entire, but sometimes the contents of their stomachs still remain between their ribs, as before remarked, so that we can discover the particular species of fish on which they lived, and the form of their excrements. Not unfrequently there are layers of these coprolites, at different depths in the Lias, at a distance from any entire skeletons of the marine lizards from which they were derived; ‘ as if,’ says Sir H. de la Beche, ‘ the muddy bottom of the sea received small sudden accessions of matter from time to time, covering up the coprolites and other exuviae which had accumulated during the intervals.’ It is further stated that, at Lyme Regis, those surfaces only of the coprolites which lay uppermost at the bottom of the sea have suffered partial decay, from the action of water before they were covered and protected by the muddy sediment that has afterwards permanently enveloped them.

“ Numerous specimens of the Calamary, or pen-and-ink fish (*Geoteuthis bollensis*), have also been met with in the Lias at Lyme, with the ink-bags still distended, containing the ink in a dried state, chiefly composed of carbon, and but slightly impregnated with carbonate of lime. These cephalopoda, therefore, must, like the saurians, have been soon buried in sediment; for, if long exposed after death, the membrane containing the ink would have decayed.”⁵

⁵ Elements of Geo., pp. 362, 363. Bridgewater Treatise, p. 115. Geological Researches, p. 334. Buckland, Bridgewater Treatise, p. 307.

Hugh Miller says: "The river bull-head, when attacked by an enemy, or immediately as it feels the hook in its jaws, erects its two spines at nearly right angles with the plates of the head, as if to render itself as difficult of being swallowed as possible. The attitude is one of danger and alarm; and it is a curious fact * * * that in this attitude nine-tenths of the *Pterichthys* of the Lower Old Red Sandstone are found. We read in the stone a singularly preserved story of the strong instinctive love of life, and of the mingled fear and anger implanted for its preservation—'The champions in distorted postures threat.' It presents us, too, with a wonderful record of violent death falling at once, not on a few individuals, but on whole tribes." ⁶

Again, the above author describes a scene of death which suggests at once the agency of pollution from the fall of cosmical canopy dust. He says:

"At this period of our history, some terrible catastrophe involved in sudden destruction the fish of an area at least a hundred miles from boundary to boundary, perhaps much more. The same platform in Orkney as at Cromarty is strewn thick with remains, which exhibit unequivocally the marks of violent death. The figures are contorted, contracted, curved; the tail in many instances is bent round to the head; the spines stick out; the fins are spread to the full, as in fish that die in convulsions. The *Pterichthys* shows its arms extended at their stiffest angle, as if prepared for an enemy. The attitude of the ichthyolites on this platform are attitudes of fear, anger, and pain. The remains, too, appear to have suffered nothing from the after-attacks of predaceous fishes; none such seem to have survived. The record is one of destruction at once widely spread and total, so far as it extended. There are proofs that, whatever may have been the cause of the catastrophe, it must have taken

⁶ "Old Red Sandstone," chap. ii, p. 48.

place in a sea unusually still. The scales, when scattered by some slight undulation, are scattered to the distance of only a few inches, and still exhibit their enamel entire, and their peculiar fineness of edge. The spines, even when separated, retain their original needle-like sharpness of point. Rays well nigh as slender as horse-hairs are enclosed unbroken in the mass. Whole ichthyolites occur, in which not only all the parts survive, but even the expression which the stiff and threatening attitude conveyed when the last struggle was over. Destruction must have come in the calm, and it must have been of a kind by which the calm was nothing disturbed. In what could it have originated? By what quiet but potent agency of destruction were the innumerable existences of an area perhaps ten thousand square miles in extent annihilated at once, and yet the medium in which they had lived left undisturbed by its operations? Conjecture lacks footing in grappling with the enigma, and expatiates in uncertainty over all the known phenomena of death. Diseases of mysterious origin break out at times in the animal kingdom, and well nigh exterminate the tribes on which they fall. The present generation has seen a hundred millions of the human family swept away by a disease unknown to our fathers. Virgil describes the fatal murrain that once depopulated the Alps, not more as a poet than as a historian. The shell-fish of the rivers of North America died in such vast abundance during a year of the present century, that the animals, washed out of their shells, lay rotting in masses beside the banks, infecting the very air. About the close of the last century, the haddock well nigh disappeared, for several seasons together, from the eastern coasts of Scotland; and it is related by Creech that a Scotch shipmaster of the period sailed for several leagues on the coast of Norway, about the time the scarcity began, through a floating shoal of dead haddocks. But the ravages of no such disease, however excessive, could well account for some of the phenomena

of this platform of death. It is rarely that disease falls equally on many different tribes at once, and never does it fall with instantaneous suddenness; whereas in the ruin of this platform from ten to twelve distinct genera seem to have been equally involved; and so suddenly did it perform its work that its victims were fixed in their first attitude of terror and surprise. I have observed, too, that groups of adjoining nodules are charged frequently with fragments of the same variety of ichthyolite; and the circumstance seems fraught with evidence regarding both the original habits of the creatures and the instantaneous suddenness of the destruction by which they were overtaken. They seem, like many of our existing fish, to have been gregarious, and to have perished together ere their crowds had time to break up and disperse.

“Fish have been found floating dead in shoals beside submarine volcanoes—killed either by the heated water or by mephitic gases. There are, however, no marks of volcanic activity in connection with the ichthyolite beds—no marks, at least, which belong to nearly the same age with the fossils. The disturbing granite of the neighboring eminences was not upheaved until after the times of the Oolite. But the volcano, if such was the destroying agent, might have been distant; nay, from some of the points in an area of such immense extent, it *must* have been distant. The beds abound, as has been said, in lime; and the thought has often struck me that calcined lime, cast out as ashes from some distant crater, and carried by the winds, might have been the cause of the widely spread destruction to which their organisms testify. I have seen the fish of a small trouting stream, over which a bridge was in the course of building, destroyed in a single hour, for a full mile below the erection, by the few troughfuls of lime that fell into the water when the centring was removed.”⁷

⁷ *Ibid*, pp. 221–225.

It was stated above that during the periods of canopy change sympathetic earth movements occurred. James D. Dana illustrates this point in the following language: "Prominent among the events influencing the rock-structure and life of a continent is that of mountain-making. The Appalachian Mountains stand as a grand time-boundary between the Paleozoic æon and the Mesozoic; and contemporaneous orographic movements make a like limit in European geology. Moreover, it was attended by the most remarkable of organic breaks. The Taconic Mountains mark the close of the Lower Silurian, an epoch of abrupt change in North America; and parallel disturbances occurred in Britain and Europe. The Laramide or post-Cretaceous mountain system along the Rocky Mountains is another such boundary for America, separating Mesozoic and Cenozoic time, though not as complete in the attendant organic break as in the physical. But it so happens that no corresponding event occurred at this time in Europe, the orographic movements most nearly synchronous taking place after the commencement of Cenozoic time. Nevertheless, the organic break at the close of the Cretaceous period is even greater for Europe than for America. Such a fact seems to show that there was some other catastrophic event concerned; but its nature is yet to be studied out."⁸

Again Dana says: "Paleozoic time is naturally divided into two sections at the break between the Lower and Upper Silurian. This boundary line is marked in the history by an epoch of mountain-making in eastern North America and western Europe, and by a somewhat abrupt transition in animal life of the seas."⁹

We need not stop to point to the drift and meaning of all this testimony. In the last hundred years geology, like biology, has tossed from the cataclysms of Cuvier and his

⁸ Manual of Geo., 4th ed., pt. iv, p. 406.

⁹ *Ibid*, p. 460.

geological revelations to the slow principle of the Doctrine of Uniformity as advocated by Sir Charles Lyell. The latter is antiquated, and at the present time the best thought of the age is swinging back under the leadership of Suess to recognize sudden transformations.

The late Joseph Le Conte is one of those who have recognized the fact that "the present condition of geological evidence is undoubtedly in favor of some degree of suddenness." He adds further on in the same work from which the above is cited: "In the evolution of the organic kingdom, as in the evolution of the earth, in the evolution of society, in the evolution of the egg, in fact, as in all evolution, there have been periods of comparative quiet and periods of rapid change."¹⁰

The doctrine of evolution by distinct and abrupt mutations, as advanced by De Vries,¹¹ which is now claiming the closest attention of the biological world, clearly recognizes this fact. The present hypothesis presents the causes which stimulated the individual or perhaps whole colonies to become mutants.

Closely related to the suddenness is the fact of periodicity in the introduction of species. They come in by bursts or flood tides at particular points of time. These periods are followed and preceded by times of ebb in which little that is new is evolved. It is a significant fact that since the Glacial age no new species of mammal has originated.

"A great number of zoölogists, botanists, and paleontologists are inclined to adopt this notion of sudden changes as consonant with the teachings of experience. We may cite in this connection the well-known argument of Agassiz. This celebrated naturalist called attention to the simultaneous appearance, in the first fossiliferous strata, of a mixed fauna

¹⁰ "Religion and Science," pp. 22, 25.

¹¹ *Die Mutationstheorie*, 1903.

comprising representations of all the grand divisions of the animal kingdom. This is shown in the Upper Silurian or Devonian horizon in which the vertebrates make their appearance in the form of fish. In the most ancient fauna, and that which has become known most recently (that of the Lower Silurian or Cambrian), all the grand divisions are still found, except that of vertebrates, each represented by quite high types. It is a question to be decided whether, lower down, in the sedimentary rocks hitherto considered as azoic, there is really a living population, more scattered, and reduced to the most rudimentary animals and plants—that is to say, to protophytes and protozoes, as appears from the researches of MM. Barrois, Bertrand, and Cayeux. Yet it is none the less certain that the very important remark of Agassiz is true, and that, in the Cambrian horizon, all the principal types appear simultaneously. We recognize here a sort of explosion of universal life.

“In consequence of this the transformists are obliged to admit that in the short space of time that corresponds to the deposit of the most ancient fossiliferous rocks the first living beings must have undergone all the evolutions necessary for passing from the state of a simple mass of protoplasm to that of types characteristic of all the grand divisions, the vertebrates only excepted. We are authorized to conclude that the time during which the most ancient fossiliferous rocks were deposited was short, because we can judge of it from their thickness, which is much inferior to that of the subsequent strata. Therefore, but a comparatively short space of time was required for the modifications by virtue of which the first living forms produced the principal grand divisions. The Lower Silurian epoch was one of rapid transformations, of active morphogenesis, of intensive mutations. If we wished to suppose that these were caused by the Darwinian mechanism of slow accumulations of minute variations, we would be obliged to throw back the origin of

life into an epoch inconceivably beyond the most ancient geologic epoch now known.

"In the same way, as other paleontologists have observed,—among whom is Dr. Charles A. White,—the extraordinary flora of the carboniferous epoch developed abruptly. We know nothing or but very little of the floras that preceded it. Its appearance and its extinction were sudden.

"We might multiply these remarks relative to the abrupt explosions of creation in living things. Here is another. The dinosaurian lizards that abounded throughout the secondary epoch, forming, indeed, the dominant animal type, show an extreme variety taken from any point of view. There were some gigantic ones, like *Brontosaurus*, having a mass that was certainly equal to that of four or five elephants; others of small stature, not larger than a domestic fowl. The group included carnivora and herbivora, aquatic species and terrestrial species, quadrupeds, and bipeds quite similar to birds, except as to the faculty of flight. By the variety of their types of organization, they form, as aptly stated by Frederick A. Lucas, a sort of epitome of the class of reptiles. Now, their appearance and differentiation were comparatively abrupt and sudden phenomena. It does not seem probable that they were formed by the mechanism of natural selection, and that they were destroyed because of their inferiority to other species in the struggle for existence.

"We arrive at similar conclusions from an examination of the first placental mammals. They appeared abruptly at the beginning of the Tertiary period; they assumed a variety of forms almost as numerous as those of the mammals of to-day, and they finally disappeared."¹²

L. P. Gratacap, in a paper on "Biological Crises," says: "Assuming a great age for this development [reference is to the faunal basins of the Lower Carboniferous], the expres-

¹² A. Dastre, Article on the New Theory of the Origin of the Species, *Scientific American Supplement*, No. 1510.

sion of suddenness is not unwarranted in referring to them. There is certainly slender suggestion in the Devonian of such large and opulent supplies of crinoidal life. The 'biological crisis' they present is not simply apparent. It is real."¹³

New species arise from an old stock, not by continuous and slow changes, but suddenly. The genius of evolution seems to be seeking that mystic cause; the modifying effects of external circumstances due to the various phenomena connected with this belted canopy hypothesis rounds out the whole scheme.

In a manner never dreamt of in the philosophy of Lamarck, physical conditions enter into the problem of evolution, evolving, as it were, a new evolution. As stated above, the present hypothesis presents the causes which stimulated the individual, or perhaps whole colonies, to become mutants.

According to De Vries' hypothesis, the degree of mutability is dependent upon external life conditions. Our new hypothesis presents the greatest variety of these. As each canopy overspread the earth, the whole environment was changed. Climate was changed and food supply. The quality of the light was altered. Absorption of the red rays of the solar spectrum took place. The content of the air and its density were altered. The pull of gravity from above caused a loss of weight. Waters were impregnated. Sympathetic volcanic action caused by the disarrangement of the tidal uplift occurred. Land connections or land bridges in the polar regions partially laid bare by the rush of waters towards the equator facilitated geographical migration, etc., etc. All these and many more disturbances went to make up quite a budget of altered external conditions. These produced great changes in life already existent, and when a canopy system fell, extermination in whole or in part, and readap-

¹³ *American Geologist*, vol. xxviii, No. 4, p. 234.

tation of the survivors, followed. Mutation under such conditions was necessary; it meant natural preservation. In this way the single steps of evolution were brought about. The survival of the fittest meant the survival of those individuals or species best fitted to adapt themselves to the new conditions. Evolution is at a comparative standstill since the Glacial age, for the reason that physical nature has been in a like quiescent state.

CHAPTER VI

DENSITY OF THE ATMOSPHERE AND OTHER PHYSICAL PHENOMENA

LAMARCK gives the following as a definition of species: "A species is a collection of similar individuals which are perpetuated by generation in the same condition as long as their environment has not changed sufficiently to bring about variation in their habits, their character, and their forms."

Herbert Spencer says: "The direct action of the medium was the primordial factor of organic evolution."

The botanist Sachs asserts: "A far greater portion of the phenomena of life is called forth by external influences than one formerly ventured to assume. Every phenomenon of life arises from two factors: on the one hand from the structure transmitted from the mother organism, and on the other from external forces working on this structure."

This truth is aptly illustrated by the following experiment: If a radium tube of proper strength be suspended in water containing tadpoles, this first stage of the common frog is prolonged, but eccentricities of growth occur and monsters are produced.¹

Another striking demonstration is found in the external anatomy of the celebrated trout which was introduced into New Zealand. In this case the number of pyloric appendages about the stomach augmented rapidly, and even the form and the size of the animal changed. This all took place quickly, and it shows the potent effects of environment. When Nature is stimulated by sufficient causes it is capable of transforming animals, we might say, suddenly.

¹ Robert H. Bradbury, "Radium and Radio-Activity in General," *The Franklin Institute Journal*, vol. clix, No. 3, March, 1905.

But in this age Nature is not stimulated to this degree, hence it is an age of quiescence. Yet this is the age which, according to the Doctrine of Uniformity, should show the greatest changes, for it is an age of complex organisms. The possibilities for a complex or old form to undergo changes cannot be questioned. The complex is more easily deranged than the simple. Why, then, do forms not change in this present age? Plainly, Nature is not stimulated by sufficient causes.

It will not do to say that variation was at one time more active with each species because forms were younger. In fact, such an argument only strengthens our position, for the above reasoning shows us that the further we get away from simple forms, the greater are the varieties, hence, plainly, the causes which stimulated Nature when she was young must have been very pronounced.

Natural selection is always ready to make use of adapted variations. Thus, the gull fed on corn will develop a gizzard. The wild duck when tamed will differ from the same species in the length of wing. The green frogs taken from the forest and placed in colorless surroundings become sombre gray. But these examples do not become "fixed"—that is, their biological associations have not been sufficiently changed to cause them to develop into new animals—and the sombre frog replaced in the bright green foliage soon regains his former color. Changes resulting from age-producing canopy falls were of a more serious and permanent character.

Nature apparently has some pretty large blanks, and it must have taken correspondingly great physical changes to bridge these chasms. The present hypothesis reveals the most powerful physical agencies ever dreamt of in the philosophy of man, therefore it is best fitted to cope with the conditions.

James D. Dana says, speaking of these blanks:

"One of these is the apparently sudden appearance of

plants of the tribe of Angiosperms, the most common kind of Recent time, in the Lower Cretaceous; another, the still more remarkably abrupt introduction of ordinary or placental Mammals as successors to the Marsupials at the commencement of the Tertiary; another, the introduction of well-characterized Fishes, without the discovery of their precursors." ² Such gaps are of course every day being lessened by the discoveries of intermediate links, but if correctly balanced, there is still a very wide interval in the chain of life that physical environment alone can account for.

Again, the destruction of vast horizons at the end of the ages speaks volumes. Dana describes the fact in these words:

"This sweeping from the world of so large a part of its life, and especially that of Mesozoic characteristics, was a much-needed preparation for the era of the 'Reign of Mammals.' It was an opportunity for the 'survival of the fittest' on a grand scale; that is, the survival of those species that could withstand the special causes of destruction, and of the many that were out of harm's way. The exterminations were the removals of hindrances to progress. The survival of the fittest and of the lucky ones, while not directly species-making, was the origin of new associations in continental and oceanic life; that is, of new faunas and new floras over the world, in which, under the modified geographical and physical conditions, the elements existed for further change and progress." ³

One of the potent physical changes which would have caused a general extermination at the end of an age would have been a fluctuation in the density of the atmosphere. It has been facetiously said that the Dinosaur of the species of Triceratops died of its big head. Many a true word has been spoken in jest, and this is not one of the least of the

² Manual of Geology, 4th ed., p. 1031.

³ *Ibid.*, p. 878.

many. "A head of one of these has been found more than six feet long and four feet wide, and another over eight feet long."⁴ Every skeleton is the solution of a problem in mechanics, to wit, the problem of carrying a given weight and of adaptation to a given mode of life. Thus often a variation in condition has proved fatal to a whole race. *Elephas ganesa*, a species of mammoth found in Pliocene deposits of the Sidwalik Hills, India, had tusks twelve feet nine inches long and two feet two inches in circumference. It is a mystery how these animals ever carried them, owing to their enormous size and leverage.

Another one of the creatures that came to its end through its big head was *Dinotherium giganteum*. This animal was of elephantine proportions, and lived in the Miocene. It was characterized by an enormous head, over six feet long, and unquestionably it labored under great mechanical disadvantage in lifting its immense weight in the process of mastication. It can be seen, then, how any change in the density of the atmosphere directly influenced its chances in the struggle for life.

Again, such great and necessarily sluggish brutes as *Brontosaurus* and *Diplodocus*, with their tons of flesh to carry, and their small heads and feeble teeth, were obviously reared in circumstances that must have been easy for them, as they were unfitted to serve in any strenuous struggle for existence. The peculiar make-up of these animals has a meaning that may now be understood. The great ground sloths, the *Mylodons*, *Megatheres*, and their allies, are another case in point; they became extinct when the conditions changed.

These are only instances taken at random. Geology reveals the fact that in the past our earth has been peopled with huge creatures. Plant life also was very different then

⁴Le Conte, *Geo.*, 5th ed., p. 518.

from now. Grasses and ferns were as large as our trees. Everything was so gigantic that plant and animal life seemed fairly to vie with each other in the production of monstrous growths. There was a reason for all this. Was it not the greater density of the atmosphere? Geologists say that during certain ages, especially the Carboniferous, the air was very heavy and excessively damp. But why was it heavy and damp?

Explanations are not necessary. It is understood that the belts as they descended formed canopies which in turn pressed downward on the upper air, materially increasing the density and weight of the atmosphere itself. One of the secondary results was that oxygenation was freer. A candle burns brighter in a condensed atmosphere, as seen in the caissons where the laborer works under pressure. The effect of all this upon life was to foster gigantic growths.⁵

The increased buoyant power of the atmosphere was also derived from another cause, to wit: In opposition to terrestrial gravity the contrary attraction of the annular system diminished the weight in a notable proportion. There must have been a zone where bodies were attracted equally from above and below.

It has been claimed that since the fossil impress of rain-drops in the past geological ages are such as would be made by our modern storms, therefore the atmosphere of these periods must have been of a like density to our own. This argument seems to overlook the increased buoyancy. Probably these drops were heavier and therefore had a greater penetrating power, yet on the whole why should we say this? There was nothing in the conditions to cause their form to differ radically from those of to-day, and if they were heavier the increased buoyancy of the atmosphere would have neutralized the results.

⁵ "Alpha and Omega," pp. 144, 145.

The increased buoyancy must have been specially favorable at times to large bird and insect life, and the conditions in general to a cryptogamic and gymnospermous flora. But these same conditions must have been alike adverse to the well-being of the higher order of flowering plants, and of the quick-breathing animals. Of course birds come under this last capitulation, but the winged denizens of the air in the early paleontologic ages were of a different character from their posterity, and then it must not be forgotten that during certain geological periods the condensed oxygen of the atmosphere took the place of the miasmatic influence of other periods.

The dragons of the air which soared in ancient times, like the Roc of Arabian romance, were not able to survive the changes, which were to them of vital moment. Pterodactyles, computed to have had a spread of wing of over twenty feet, perished in great numbers. Their battered and broken bones are found in the graveyard of the rocks. "At least two Pterodactyles are found in the Oxford clay, known from more or less fragmentary remains or isolated bones; just as they occur in the Kimeridge clay, Purbeck limestone, Wealden sandstones, and especially in newer Secondary rocks, named Gault, Upper Greensand, and Chalk, in the southeast of England."⁶ A thousand of these bones taken from the Cambridge Greensand are now in the Woodwardian Museum of the University of Cambridge. Seeley draws attention to the fact that these were mostly all gathered during two or three years.

This gives us some idea of their abundance in the days when their outstretched pinions enabled them to seek the air for their safety. But how long did this safety endure? When the canopy disintegrated the atmosphere was released from the superincumbent burden and the sustaining power

⁶ H. G. Seeley, "Dragons of the Air," p. 33.

of the air was gone.⁷ Thus the chapter of these great birds was closed forever. The ostrich and the recently extinct moas of New Zealand are survivors of a late annular or canopy fall that have been able to adapt themselves to a terrestrial existence. Deprived of their power of flight, they have become the fleet-footed creature which "scorneth the horse and his rider." Nature flung away the wings, as she always does with every part of a skeleton which is not vital. In New Zealand the skeleton of the *Dinornis elephantopus* from the Post-Pliocene, and in Madagascar the bones of another huge wingless bird, the *Æpiornis maximus*, are but instances taken at random, which show how this class of beings existed for a time and then perished. Nature changed their organisms, but as the altered conditions of life were too radical, she could not save them from ultimate extinction.

The great size of some of the Devonian and Carboniferous insects is another indication of the denser atmosphere. Dana says: "A spread of wing exceeding two feet is a size now existing only in large bats and birds."⁸ The inference is obvious.

The consensus of geological opinion is that the atmosphere must originally have differed in its constituents from its present condition. Planetesimal dust and gaseous emanations entering the air belt would largely account for this phenomenon. Canopy formation and decline produced at different times and in different ways divers conditions. These conditions are at the root of the process of evolution. De Vries' theory is the key; the lock in which it turns is set forth in this present hypothesis. Little and great physical differences, little and great changes, simply meant adaptation, adjustment, or extinction.

⁷ A calamity of this nature appears from the evidence to have occurred in the Cretaceous era of Mesozoic time.

⁸ Manual of Geo., 4th ed., p. 721.

As an illustration of the influence of a very slight change in the atmospheric content, it is remarked that ferns and monocotyledons are scarce in comparison with dicotyledons in the Rocky Mountains. Dryness and rarity of the atmosphere, less pressure, heat, and carbon dioxide, being the assigned cause.

An important result of Langley's bolometric investigation is the discovery that the earth's atmosphere exerts a selective absorption to a remarkable degree, keeping back an immense proportion of blue and green. It is postulated that our atmosphere has varied a great deal in the past, and so must have exerted a great effect on the flora and fauna of these bygone ages. The fact is, the unveiled sun is blue.⁹ Our atmosphere now stops the shortest wave-lengths, the ultra-violet, and it is said that scarcely sixty per cent. of the solar rays penetrate to the earth's surface. Has it always been so? Probably—yea, we can almost say with certainty—there have been ages in the past when the selective absorption was even more pronounced than now.

The spectra of Saturn and Jupiter show the distinctive dark line in the red (wave-length 618). This is an unmistakable indication of aqueous absorption.¹⁰ Tyndall says that, "regarding the earth as a source of heat, I estimate that at least 10 per cent. of its heat is intercepted within ten feet of the surface. This single fact suggests the enormous influence which this newly-developed property of aqueous vapor must have in the phenomena of meteorology."¹¹

Experiments have been made at the laboratory in the Catacombs on the effect of darkness upon animals. The crustaceans (*Gammarus fluviatilis*) changed as follows: The gray pigment disappeared entirely. The organs of

⁹ A. M. Clerke, "History of Astronomy During the Nineteenth Century," 3d ed., pt. ii, chap. v, p. 278.

¹⁰ *Ibid.*, pt. ii, chap. viii, p. 368.

¹¹ "Heat a Mode of Motion," 6th ed., Lect. xiii, pp. 380-381.

smell, touch, and taste showed a marked hypertrophy at the end of a few months, and their length increased gradually until their dimensions tripled. Again, in the aquarium building in the Jardin des Plantes just over the laboratory in the Catacombs, experiments were made of a reverse nature, and the *Proteus* commenced to assume a color; at first this was light, but it ended in a violet black, with occasional small yellow patches.¹²

Most of the dinosaurs, owing to their great eye-sockets, are thought to have had nocturnal habits, yet possibly this was a result of physical conditions. The Reptilian age may have been characterized by a dense dark canopy that admitted the passage of only a little light. The flora of the period also points to this conclusion. Instances such as these could be added indefinitely, but all that is required is to show that variation in the quality and quantity of light would have exerted a great influence on life in general. It may be well to add that at times of darkness, like the ones we have just pictured, open zones existed at the poles, where no doubt certain species that could not have existed without light survived the ordeal.

Clouds are more translucent than transcalent, hence light rays, in the days of the canopy, reached the earth's surface to a far greater degree than the heat rays, though those which did come through were boxed in, as it were, since radiation into space was largely intercepted. Thus to a great extent there was a complete reversal of present conditions.

The effects of heat and cold on the process of evolution cannot be questioned; however, a few illustrations will not be out of place. "It has been suspected," says the *Scientific American*, "that temperature changes and new environments might have something to do with the origin of species, and the experiment has been tried of breeding butterflies at various

¹² *Scientific American*, vol. xc, No. 17.

degrees of heat. Dr. M. Standfuss, of Zürich, has done some very extensive work along this line, producing arctic and tropical varieties as well as intermediate forms by raising the butterflies in heated or cooled boxes. It is claimed that butterflies thus reared are not fixed species and will not breed true. In one case, however, Standfuss has apparently succeeded in obtaining a fixed species by this treatment.”¹³

Another article in a later number of the same paper contains the following notice: “Prof. Max Standfuss has for years been propagating butterflies and moths under artificial temperature conditions. He has taken the eggs of middle European moths, for example, and bred them at very low temperatures, and obtained varieties of that same middle European moth found only in Arctic regions. Similarly, eggs of the middle European moths, hatched at very high temperatures, produce varieties that are to be found only in tropical countries. Furthermore, by changing the temperatures he has obtained varieties which have existed but are now extinct.”¹⁴

Climatic influences may have also been largely aided in their work by secondary causes. Thus it is well known that the gorilla does not thrive when removed from his native miasmatic swamps. The effluvia of decaying vegetation and the humid reeking atmosphere seem necessary to his very existence. Again, in certain localities in our American tropics a rich gray moss is found growing luxuriously; it is an aërial plant, and yet it does not thrive if removed into a region of pure air; indeed, it seems to imbibe something from the surrounding swamps. It is not carbonic acid gas, the chief food of plants, nor is it nitrogen; all we know is that the element which this plant requires is found in that murky atmosphere, and that it is deadly to human life. Moisture and heat alone will not account for it.

¹³ Vol. xcv, No. 10, Sept. 8, 1906.

¹⁴ *Ibid.*, vol. xcv, No. 15, Oct. 13, 1906.

CHAPTER VII

VICISSITUDES OF CLIMATE

ALL who possess any knowledge whatever of geology know that in the past eras meteorological conditions differed radically from those extant. However, as this work is for the general reader as well as the specialist, and as all have not been schooled in the workings of nature, a few facts relative to what is really known of the past climates will be in order. Consideration of these same facts naturally stimulates the mind to inquire as to the cause of these wonderful variations, and every little detail that helps is welcomed. Thus, even though the hypothesis that the earth has cooled from a molten condition is thoroughly discredited, it would seem natural if the records of the past showed that from age to age the climate was gradually cooling, for the planetesimal hypothesis, now generally accepted, postulates a condition of heat brought about by gravitational settling. Probably, however, this was in the remote days before geological time dawned, for the fact remains, the records of the science do not show this gradual cooling. While it is not purposed to arrange the quotations which follow in their geological sequence, still they may be read with this point in mind. The reader's attention is called to the fact that glacial ages frequently followed periods of luxuriant growth.

James D. Dana says: "Using the facts from the relations of existing plants to climate—that Ferns and Lycopods thrive best in tropical and temperate latitudes, and Equiseta in temperate—it is inferred from the occurrence of coal-plants of each of these groups in all latitudes to the Arctic regions that the climate of the globe in the Carbonic era was nowhere colder than the modern temperate zone, or

below a mean temperature of 60° F. Similarly, the occurrence in Spitzbergen of Corals of the genera *Lithostrotion*, *Cyathophyllum*, and *Syringopora*, and of some species of Brachiopods of twice the size they have in Europe, seems to show that the waters of the ocean were equally temperate throughout. As to excessive heat in the tropics, we have no evidence, since the common Carboniferous Brachiopods, *Productus semireticulatus*, *P. longispinus*, *Athyris subtilita*, and a Bellerophon near *B. Urii*, are found in the Bolivian Andes.”¹

Again, our author states: “During the Cretaceous period a warm climate still prevailed over the earth even to the poles, but with some cooling during the closing part of the period; and in North America with a great Central Interior Sea, to the end of the period, the climate was moist. The Cycads and associated species of plants in the lower Cretaceous beds of Greenland indicate, according to Heer, a mean temperature of 21° C. to 22° C., or about 70° F. to 72° F. This temperature is that of Cuba. The facts prove that a somewhat similar temperature prevailed at the same time over Spitzbergen and Alaska, where the same flora existed; even along the Atlantic border, at least as far north as Long Island; in the region of the Kootanie beds in Montana, and the neighboring part of British America; and over more western North America to Alaska.”²

Professor Arthur Lake’s testimony may be added as follows: “The recent discoveries of fields of lignitic and bituminous coal in Alaska, besides their great economic importance in that partially treeless and much besnowed region, point to some well-known and interesting geological facts; viz., that there were periods in the world’s history when, instead of the present ice cap and treelessness, the Arctics

¹ Manual of Geo., 4th ed., p. 711.

² *Ibid.*, p. 872.

were a region clad with a luxuriant, temperate, if not tropical, vegetation, and enjoying a temperate, if not a warm, climate. There may or may not have been an open Polar sea, but it needed no Arctic hardships to explore it, and there certainly was no ice cap.”³

T. C. Chamberlin says: “It appears necessary now to accept as demonstrative the evidences of extensive glaciation in India, Australia, and South Africa in the midst of the later coal-forming stages of the Paleozoic era. The glacial beds lie even between coal beds of Permian or Permian-Carboniferous age; while, strangely enough, the areas of glaciation approach, and even overlap, the tropics of Cancer and Capricorn. And yet figs and magnolias have grown in Greenland since, and mild polar climates are as well authenticated after as before this climacteric glaciation. Less complete evidences from China and Norway imply a very much earlier glaciation, falling in the oldest Cambrian, or perhaps even pre-Cambrian, times. Still more recently, similar evidences of early Paleozoic glaciation in South Africa have been announced.

“The climatic student seems therefore compelled to face oscillations within the known geologic periods, ranging from sub-tropical congeniality within the polar circles, on the one hand, to glacial conditions in low latitudes, on the other, and these *in alternating succession*; while neither of these oscillations was permitted to swim across the narrow limital lines of organic endurance.”⁴

Again turning to Professor Dana, we find that “the cold that followed the Champlain period, or that of the Reindeer era of Lartet, appears to have brought destruction among the northern tribes of Europe and Asia, and, at the same time, to have driven southward the more active sur-

³ “*Mines and Minerals*,” vol. xxvi, No. 9, p. 401.

⁴ *Journal of Geology*, vol. xiv, No. 5, p. 366.

vivors, or those which had the best chance for escape. The encasing in ice of huge Elephants, and the perfect preservation of the flesh, shows that the cold finally became *suddenly* extreme, as of a single winter's night, and knew no relenting afterward. The existence of remains of the Reindeer in southern France, of the Marmot, also a northern species, and of the Ibex and Chamois, now Alpine species, is attributed by Lartet to the forced migration thus occasioned. In the caves of Perigord (Dordogne, etc.) the bones of the Reindeer, far the most abundant kind, lie along with those of the Cave Hyena, Cave Bear, Cave Lion, Elephant, and Rhinoceros, as well as Horse and Aurochs." ⁵

In the Monograph on the Geology of the Narragansett Basin the following remarks are made by the authors: "We may first note that the deposits formed during the times represented by the conglomerates of the Carboniferous series have a character which warrants the hypothesis that they are to a considerable extent the products of glacial action. * * *

"Although there are instances in which a torrent may accumulate a large detrital cone composed of boulders and pebbles, I know of no geological machinery now at work on the earth's surface, or which can reasonably be supposed to have operated in the past, except glaciation, that is competent to produce such immense masses of coarse detritus as are contained in these conglomerates, or bring them into position where water action can effect their arrangement into beds. The area of the deposits lying on the two sides of the old Appalachian axis probably now exceeds 60,000 square miles; the average thickness of the section is certainly not less than 2,500 feet; so that the amount of matter of a prevailingly coarse nature which was laid down along the old Appalachian ridge in a period apparently of no great duration was not

⁵ Man. of Geo., 4th ed., pp. 1007, 1008.

less than 20,000 cubic miles, and probably was far more than that amount. * * *

“It should be noted that the pebbles of the Carboniferous conglomerates, especially in the Narragansett district, show no trace of glacial scratches; moreover, they generally have a rather rounded form and are of less varied size than those in any of the till deposits formed during the last Glacial period. In some cases, however, they seem to me to retain the faceted shape which is so characteristic of ice-made pebbles. When compared with the pebbles of the last Glacial period, which, in a measure, have been subjected to marine or stream action, they are found to correspond with them in all essential features, except when, as is often the case, the old fragments have been deformed by stresses which came upon them since they were built into the Carboniferous strata. * * *

“In no way save by glacial work does it seem to me possible to account for the rapid formation of the great mass of pebbly detritus which is contained in these beds. It therefore may fairly be held that the Carboniferous period, in this district at least, was one of extensive and long-continued glacial action, and that the greater part of the section exhibited in the basin is made up of rocks which owe their more important features to the action of glaciation.”⁶

Ernest H. L. Schwartz, who made a geological survey of Cape Colony in 1896, says: “No matter how good the specimens of glaciated boulders and the photographs of ice-scored floors, that came home from India, Australia, or South Africa, no one would believe in the Permian Ice age. I was myself skeptical when I first came to South Africa, and at a meeting in Cape Town, when some of the glaciated Dwyka Conglomerate pebbles were exhibited, assisted in recording the belief that there was in these scratches no satisfactory evidence of ice-action. * * *

⁶ Mono. xxxiii, pp. 64-67.

“In the field it is different; there the evidence is overwhelming, as I was soon to see when I joined the Geological Survey. * * *

“The Dwyka Conglomerate, and its equivalent in Australia and India, is too well known now to require description here, but I have introduced the account of the part which Mr. Rogers and myself played in the elucidation of the problem in order to show the credentials with which we offer evidence of two more glacial periods in South Africa. The evidence of each was discovered by Mr. Rogers; the evidence of one, probably Devonian in age, I have examined in the field; the other is probably Archean, and although I have not seen the glacial beds in place, the specimens which Mr. Rogers has sent me form ample material for confirming his interpretation. * * *

“At some future date it will perhaps be established that there is a rhythmic recurrence of glacial conditions in sub-tropical and even tropical countries, and we shall be able to date the rock strata according to the positions of these tills. In Australia they have two—the Permian or Carbo-Permian, and the so-called Cambrian one, which is, at any rate, older than the Ordovician, and possibly Algonkian. We have three in South Africa, the oldest of which may be equivalent to the older of the two Australian ones. * * *

“Sir Andrew Ramsay’s evidence as to the European Paleozoic Ice age, and the character of the striations on the stones, is admitted, even by those who do not accept his explanation, to be strongly suggestive.”⁷

Alexander Winchell records like facts in the following. He says: “Some of the most salient phenomena attributed to the reign of glacier ice are smoothed and striated rock-surfaces, and accumulations of rounded pebbles. Precisely these phenomena have been detected among the rocks of re-

⁷ *Journal of Geology*, vol. xiv, No. 8, pp. 683, 684, 689, 690,

moter ages of the world's history. More than thirty years ago the New York geologists called attention to the smoothed surfaces of the Medina Sandstone in the western part of that State. They did not then dare to utter the conjecture that these are glaciated surfaces; though recent opinion strongly inclines in that direction. Foreign geologists have made similar observations in numerous other formations. In the Miocene System, that vast Swiss formation known as the *Molasse*, seems to be but an older bed of glacier pebbles, extremely similar to those accumulated upon the existing surface along the slopes and flanks of the Alps." ⁸

Le Conte states: "The Permo-Carboniferous of Australia, India, South Africa, and Brazil all contain enormous glacial deposits and other evidences of glaciation. Apparently Permian glaciation was on a vaster scale than that of the Pleistocene in the northern hemisphere." ⁹ He also says, speaking of the late period: "Of alternations of colder and warmer periods during the Glacial epoch there are evidences both in Europe and America." ¹⁰

Again William North Rice says: "The Quaternary period, instead of being brief and comparatively simple, has been shown to be of long duration and great complexity. It has been analyzed into a succession of glacial and inter-glacial epochs; and, from the vast amount of erosion in some of the inter-glacial epochs, it has been inferred that post-Glacial time is very short in comparison with inter-Glacial time." ¹¹

The flora and fauna of a region show how the climate has changed; thus G. Frederick Wright says: "On both continents, at the close of the Tertiary period, there occurred a remarkable extinction of animals which is doubtless con-

⁸ "Sparks from a Geologist's Hammer," 3d ed., pp. 177-178.

⁹ Geo., 5th ed., p. 430.

¹⁰ *Ibid.*, p. 615.

¹¹ *Scientific American Supplement*, No. 1648.

nected with the advance of the continental ice-sheet. Among these we may mention two species of the cat family as large as lions; four species of the dog family, some of them larger than wolves; two species of bears; a walrus, found in Virginia; three species of dolphins found in the Eastern States; two species of the sea-cow, found in Florida and South Carolina; six species of the horse; the existing South American tapir; a species of the South American llama; a camel; two species of bison; three species of sheep; two species of elephants and two of mastodons; a species of *Megatherium*, three of *Megalonyx*, and one of *Myodon*—huge terrestrial sloths as large as the rhinoceros, or even as large as elephants, which ranged over the Southern States to Pennsylvania, and the *Myodon* as far as the Great Lakes and Oregon.

“This wondrous assemblage of animals became extinct upon the approach of the Glacial period, as their remains are all found in post-Pliocene deposits. The intermingling of forms is remarkable.”¹²

Alexander Winchell tells us that “it is impossible to refrain from speculating on the nature of the events which resulted in the burial of entire mammoths in glacier-ice. That the climate in which they had lived was not tropical, like that of Africa or India, may be regarded as proved by the presence of the fur in which these animals were clothed. That it was not similar to the existing climate of northern Siberia is apparent from the consideration that such a climate would not yield the requisite supply of vegetation to sustain their existence. More especially would forest vegetation be wanting, which seems to have been designed as the main reliance for proboscideans. Northern Siberia must, therefore, have possessed a temperate climate.”¹³

¹² “The Ice Age in North America,” 4th ed., p. 386. “The Geographical Distribution of Animals,” vol. i, p. 129.

¹³ “Sparks from a Geologist’s Hammer,” 3d ed., pp. 243-244.

On the same line as all this testimony the great Agassiz has left the following record: "It is my belief," he says, "founded upon the tropical character of the Fauna, that a much milder climate then prevailed over the whole northern hemisphere than is now known to it. Some naturalists have supposed that the presence of the tropical Mammalia in the Northern Temperate Zone might be otherwise accounted for,—that they might have been endowed with warmer covering, with thicker hair or fur. But I think the simpler and more natural reason for their existence throughout the North is to be found in the difference of climate; and I am the more inclined to this opinion because the Tertiary animals generally, the Fishes, Shells, etc., in the same regions, are more closely allied in character to those now living in the Tropics than to those of the Temperate Zones. The Tertiary age may be called the geological summer; we shall see, hereafter, how abruptly it was brought to a close. * * *

"The long summer was over. For ages a tropical climate had prevailed over a great part of the earth, and animals whose home is now beneath the Equator roamed over the world from the far south to the very borders of the Arctics. The gigantic quadrupeds, the Mastodons, Elephants, Tigers, Lions, Hyenas, Bears, whose remains are found in Europe from its southern promontories to the northernmost limits of Siberia and Scandinavia, and in America from the Southern States to Greenland and the Melville Islands, may indeed be said to have possessed the earth in those days. But their reign was over. A sudden intense winter, that was also to last for ages, fell upon the globe; it spread over the very countries where these tropical animals had their homes, and so suddenly did it come upon them that they were embalmed beneath masses of snow and ice, without time even for the decay which follows death." ¹⁴

¹⁴ "Geological Sketches," pp. 205-206, 208.

Professor Wright quotes from the Scientific Papers of Asa Gray¹⁵ and records his own views of the past climatic conditions in the far north as follows:

“Geologically the coal beds of Greenland are much later than the Carboniferous period. The accompanying plants indicate that some of them belong to the Upper Cretaceous and others to the Middle Tertiary (Miocene). * * *

“The Tertiary beds in this region bear striking witness to the changes of climate which the region has experienced, and to the fact that there is a lineal connection between the present flora of the north temperate zone and the ancient arctic flora of Greenland. During the middle portion of the Tertiary period the climate of north Greenland corresponded closely with that which now exists in Virginia and North Carolina. As enumerated by Asa Gray, the familiar plants found in these beds comprise ‘magnolias, sassafras, hickories, gum trees, our identical southern cypress (for all we can see of difference), and especially sequoias—not only the two which obviously answer to the two big trees now peculiar to California, but several others; they equally comprise trees now peculiar to Japan and China—three kinds of ginkgo trees, for instance, one of them not evidently distinguishable from the Japan species which alone survives. We have evidence not merely of pines and maples, birches, lindens, and whatever characterize the temperate-zone forests of our era, but also of particular species of these so like those of our own time and country that we may fairly reckon them as ancestors of several of ours.’ ”¹⁶

Sir Archibald Geikie’s testimony of the vicissitudes of climate is that “in Europe and North America a tolerably sharp demarcation can usually be made between the Pliocene formations and those now to be described. The Crag deposits

¹⁵ Vol. ii, p. 227.

¹⁶ Greenland Icefields and Life in the North Atlantic,” pp. 113–114.

of the southeast of England, as we have seen, show traces of a gradual lowering of the temperature during later Pliocene times, and the same fact is indicated by the Pliocene fauna and flora on the Continent even in the Mediterranean basin. This change of climate continued until at last thoroughly Arctic conditions prevailed, under which the oldest of the Post-Tertiary or Pleistocene deposits were accumulated in northern and central Europe, and in Canada and the northern part of the United States.”¹⁷

In a foot-note the same author remarks: “That a glacial period occurred at the close of the Cretaceous period, again at the end of the Eocene and in the Miocene (erratics of Superga, near Turin), has been regarded by some geologists as probable.”¹⁸

Chamberlin and Salisbury tell us that: “In the upper division of the Old Red sandstone of Great Britain there are conglomerates of such a character as to have raised a question concerning the existence of glaciers in this region in Devonian times. The conglomerates contain boulders of all sizes, up to eight feet in diameter. While the smaller stones are usually well worn, the larger ones are often distinctly subangular. All sorts of durable rock are represented. The large boulders seem not to have come in from distant regions, but some of the smaller stones may have come from greater distances, since no local source for them is known. Furthermore, some of the boulders are said to be *striated*, and it is believed by some geologists at least that the *striæ* are glacial. The matrix of the conglomerate is in keeping with the hypothesis that ice coöperated in its making. It has been suggested that the Highlands of Scotland were then much higher than now, that they harbored glaciers, and that the

¹⁷ Text Book of Geo., 3d. ed., pp. 1023-1024.

¹⁸ *Ibid.*, note 3, p. 979. A. Vézian, Rev. Sci. xi (1877), p. 171; Schardt, “Etudes Géologiques sur le pays d’Enhaut Vaudois,” Bull. Soc. Vaud. 1884.

bergs to which the glaciers gave origin made, or helped to make, the conglomerates here referred to. The conglomerate is to be seen in the Lammermuir Hills, and in the Silurian hills of Cumberland and Westmoreland, in northern England.”¹⁹

Heat and cold certainly seem to have followed each other very closely. The same authors say: “Taking the phenomena of India, Australia, and South Africa together, they make a puzzling combination. If the chief coal-beds be referred to the Carboniferous proper, it introduces glacial beds, and a great floral break, into the midst of a system which has usually been held to be marked by great uniformity the world over.”²⁰

Again, these authors say: “Unwilling as geologists were to believe that there was a glacial period at this early stage of the earth’s history, the evidence now in hand is overwhelming, and a glacial period in Australia in the late Carboniferous or Permian period must be regarded as a demonstrated fact.” * * * The recurrence of the boulder beds points to the repeated recurrence of glacial conditions, and the great thickness both of clastic beds and of the included coal point to the great duration of the period through which the several glacial epochs were distributed.

“These remarkable phenomena are not local. Counting Tasmania, where glacial deposits are also found, the Paleozoic glaciation of Australia had a known range of nearly 22° in latitude (42° in Tasmania to 20° 30’ in Queensland), and about 35° in longitude (west from 137° 30’), though it is not known, nor perhaps probable, that all the area within these limits was glaciated. On the other hand, it is not to be understood that the phenomena here described are restricted to high altitudes; rather are they known chiefly at low levels, descending in some places nearly to the sea. The

¹⁹ Geo., vol. ii, p. 446.

²⁰ *Ibid.*, p. 602.

altitude of this region is not only low now, but it was probably low during glaciation, as shown by the relation of the glacial deposits to the marine beds. Whatever the difficulties in the way of its explanation, therefore, the fact of a long period during which glacial conditions recurred many times must be accepted.”²¹

James Geikie sums up in a few paragraphs the general results obtained by a review of the British deposits. His summary shows in the clearest manner the remarkable fluctuations of climate in a single period. It is as follows:

“1. Weybourn Crag. The North Sea occupied by an Arctic fauna.

“2. Forest-Bed of Cromer. Wider extent of land-surface, the southern portion of the North Sea a broad plain traversed by the Rhine. Climate temperate.

“3. Leda-Myalis Bed. Passage from temperate to boreal and arctic conditions. Submergence of the Rhenish alluvial plain.

“4. Arctic Fresh-water Bed. Arctic flora in England.

“5. Lower Boulder-clays. Maximum glaciation of the British Islands: *mer de glace* flows south to valley of the Thames; is confluent with the inland ice of Scandinavia.

“6. Interglacial Beds. (Fresh-water alluvia, peat, etc., cave-deposits, marine beds.) Britain probably continental; climate at first cold, then temperate. Submergence ensued towards close of the period, with conditions passing from temperate to arctic.

“7. Upper Boulder-clay. General *mer de glace*, confluent with that of Scandinavia; it did not flow so far south as that of preceding glacial epoch.

“8. Interglacial Beds. (Fresh-water alluvia, peat, etc.; marine deposits.) Britain probably again continental: climate at first temperate and insular; submergence ensues

²¹ *Ibid.*, pp. 632-634.

with cold climatic conditions—Scotland depressed for 130 feet or thereabout.

“ 9. Ground-Moraines and Terminal Moraines. Major portion of Scottish Highlands covered by ice-sheet; local ice-sheets and district glaciers in Southern Uplands of Scotland, and in mountainous parts of England, Wales, and Ireland. Icebergs are calved at mouths of Highland sea-lochs; terminal moraines dropped upon marine deposits, then forming (100-ft. beach in Scotland).

“ 10. Interglacial Beds. (Fresh-water alluvia with arctic plants; lower buried forest and peat; Coarse-clays and raised beaches.) Britain again continental; climate at first cold, subsequently becoming temperate; great forests. Eventual insulation of Britain; climate humid, and probably colder than now.

“ 11. Mountain-Valley Moraines; Corrie Moraines. In Scotland these in some places rest on raised beaches (45–50 ft. above sea); snow-line at 2,500 ft.

“ 12. Upper Buried Forest; Alluvia, etc. Re-elevation of land, to what extent is not known; climate temperate.

“ 13. Peat overlying ‘upper buried forest’; low-level Raised Beaches; high-level Corrie Glaciers, snow-line at 3,500 ft.; climate colder and more humid than now.

“ 14. Final retreat of sea to present level; decay of peat-bogs; disappearance of permanent snow; climate drier than during preceding stage (13).”²²

²² “The Great Ice Age,” 3d ed., pp. 421–422.

CHAPTER VIII

EVOLUTION AND DISTRIBUTION

DE VRIES' doctrine of evolution advances physical environment and conditions to first place in the chain of cause and effect. The great accelerations noticed in the development of life, spasmodically as it were, indicate that these conditions were radical, and it is imperative that the source should be adequate. The first cause must have been something out of the ordinary.

It is postulated that the canopy at times belted the earth, even as far north as the Arctic circle. This introduces into the polar regions three powerful factors, light, heat, and land connections. Archibald Geikie says:

"The climate during Tertiary time underwent in the northern hemisphere some remarkable changes. Judging from the terrestrial vegetation preserved in the strata, we may infer that in England the climate of the oldest Tertiary periods was of a temperate character, but that it became during Eocene time tropical and subtropical, even in the centre of Europe and North America. It then gradually grew more temperate, but flowering plants and shrubs continued to live even far within the Arctic circle, where, then as now, unless the axis of the earth has meanwhile shifted, there must have been six sunless months every year. Growing still cooler, the climate passed eventually into a phase of extreme cold, when snow and ice extended from the Arctic regions far south into Europe and North America. Since that time the cold has again diminished, until the present thermal distribution has been reached."¹

Again, speaking of Greenland, he says: "One of the

¹ Geo., 3d ed., p. 964.

most remarkable geological discoveries of modern times has been that of Tertiary plant-beds in North Greenland. Heer has described a flora extending at least up to 70° N. lat., containing 137 species, of which 46 are found also in the central European Miocene basins. More than half of the plants are trees, including 30 species of conifers (*Sequoia*, *Thujopsis*, *Salisburia*, etc.), besides beeches, oaks, planes, poplars, maples, walnuts, limes, magnolias, and many more. These plants grew on the spot, for their fruits in various stages of growth have been obtained from the deposits. From Spitzbergen ($78^{\circ} 56'$ N. lat.) 136 species of fossil plants have been named by Heer. But the latest English Arctic expedition brought to light a bed of coal, black and lustrous like one of the Paleozoic fuels, from $81^{\circ} 45'$ N. lat. It is from 25 to 30 feet thick, and is covered with black shales and sandstones full of land-plants. Heer notices 30 species, 12 of which had already been found in the Arctic Miocene zone. As in Spitzbergen, the conifers are most numerous (pines, firs, spruces, and cypresses), but there occur also the Arctic poplar, two species of birch, two of hazel, an elm, and a viburnum. In addition to these terrestrial trees and shrubs, the lacustrine waters of the time bore water-lilies, while their banks were clothed with reeds and sedges. When we remember that this vegetation grew luxuriantly within $8^{\circ} 15'$ of the North Pole, in a region which is now in darkness for half of the year, and almost continuously buried under snow and ice, we can realize the difficulty of the problem in the distribution of climate which these facts present to the geologist." ²

The difficulty has been thoroughly appreciated. J. W. Dawson makes this acknowledgment of it. He says: "It is difficult to account for these vicissitudes of climate, and much controversy exists on the subject; but it seems certain

² *Ibid.*, pp. 1001-1002.

that in the earlier Tertiary and Cretaceous periods, for example, the supplies of heat and light were so diffused over the earth as to permit the growth of a temperate vegetation in Greenland, and even Spitzbergen.”³

The polar regions now have unremitted light for six months in the year, but, owing to the climate, this energy is wasted. When the canopy induced greenhouse conditions clear up to the Arctic circle, this heat was wafted over the clear space of the north. But this is not all of the good which it did, for when the sun sank in the southern sky this marvellous roof caught its slant-wise rays. Holding these in its embrace, it reflected them back on the land, which otherwise was a land of darkness. Sunlight and twilight must therefore have endured the whole twelve months.

Next to light, the importance of the electric stimulus should be considered. Electricity must have a material conductor. When the canopy extended to the Arctic circle, the conductor was spread out as a curtain, and the frequency and intensity of the auroras may be imagined. Their effect as a stimulant to plant-growth cannot be questioned. The *Scientific American* says:

“The flora of the north polar region is remarkable for rapid growth, fertility, and brilliancy of coloring, phenomena which seem incompatible with the climate. For the Arctic summer, though nightless, is very short, the sun is low, and its rays are often intercepted by fog and clouds, so that it cannot furnish an amount of light and heat favorable to very rapid growth.

“The investigations of Prof. Lemstrom, of Helsingfors, and others, tend to show that electricity exerts a great influence on the growth of plants, and this view is confirmed by the luxuriant vegetation of the zone of action of that violent electrical manifestation, the aurora borealis. Furthermore,

³ “Origin of the World,” p. 395.

a close connection has been found, in Finland, between fruitfulness and frequency of auroras. Finally, Lemstrom was led to attribute to the sharp points of plants, such as the beard of grains, the function of 'lightning rods,' which collect atmospheric electricity and facilitate the exchange of the charges of the air and the ground.

"Thereupon he proceeded to submit the suspected effect of electricity upon vegetable growth to the test of experiment, beginning in 1885 with a number of flower-pots containing similar soil and seed. Some of the pots were subjected to the action of an influence or inductive statical machine, one pole of which was connected with the soil in the pot, and the other with a wire netting stretched over it. The other pots were left to nature. The electric machine was driven several hours daily. Within a week the electrified plants showed a more vigorous growth than the others, and in eight weeks the disparity in weight, of grain and straw alike, amounted to forty per cent." ⁴

A continent is said to have existed in these far northern latitudes in the primitive Eocene, and this same canopy-like structure which had its origin from equatorial rings points us back to the southern oceans, where the waters were held up in a heap by the gravitational pull. In after ages, when these waters were released, they not only sought their level, but they were also attracted toward the north by the weight of the ice itself.

H. W. Pearson has recently come out with a new idea as to the cause of the raised beaches, which were once necessarily near the water's level, but which have now acquired considerable elevation. The correlation of his facts relative to the uniformities of elevation and gradient of these old markings are germane to our own hypothesis. We cannot admit, however, the cause which he assigns for their origin, namely the

⁴ Vol. xcii, No. 23, June 10, 1905.

Adhemar-Croll hypothesis, of which we will have more to say hereafter. Oscillations of such long duration will not fit in with facts such as those introduced at the end of our last chapter, which showed fourteen vicissitudes of climate, some of them of a *sudden* nature, and all within one geological period. Pearson, however, has done a very good work in revealing the wide scope and the symmetrical character of the remains left by the inundations of the past. He says:

“Now, then, if glacial dams and chance upheaval of the crust are both to fail us when we seek for explanation of these strange facts in the raised beaches, it is our duty to look elsewhere, and in such a search it is soon discovered that there is but one physical cause that can be considered adequate to our needs, and this may be stated *as the displacement of the earth's centre of gravity by the accumulated ice of the last glacial epoch, and the consequent submergence of all northern shore lines.*”⁵

This brings us back to the point we were discussing: the disappearance of the primitive Eocene Arctic Continent. Pearson has found that the inclination of the beaches shows a raised gradient toward the north. Starting at sea level at the equator, they rise approximately as the sine of the latitude, until, as estimated, they would reach an altitude of 1,467 feet above present sea level at the pole. No doubt this great weight of water was the cause of the permanent depression of the land surface. Pearson believes that the shifting of the waters as indicated could have taken place only at the expense of the waters of the southern hemisphere, and while it may be true that the north claimed more than its rightful share from that region, still it seems to us more probable that it was the equatorial waters alone that were transferred.

Other authorities have likewise recognized the potent influence of the great mass of ice in causing a shifting of the waters. James Geikie says:

⁵ *Scientific American Supplement*, No. 1682, March 28, 1908.

"The view set forth by Mr. Jamieson,⁶ that the apparent rise of the sea-level in glacial times was induced by subsidence of the earth's crust under the weight of the ice-sheets, has been received with considerable favor by geologists. His leading idea is 'that the ice-covered regions were depressed by reason of the great weight of ice placed upon them, and that when the ice disappeared they rose again with extreme slowness, and may have eventually attained nearly their former level; but in most cases,' he believes, 'some amount of permanent depression probably occurred.' This hypothesis appears to explain so many facts, that geologists are naturally inclined to accept it. It accounts for the striking association of glaciation and submergence."⁷

It is suggested that the subsidence that followed this general movement was only started by these influences. It is a matter of geological record that once a land begins to rise or to sink the movement usually continues through long successive ages.

Even now the waters are not deep in the north polar region. Dr. Tarleton H. Bean, in his journal of the voyage of the *Yukon*, writes under date of August 24: "The water is quite shoal here, and generally in the Arctic, 32 fathoms being the deepest sounding on my chart—so that while an ugly sea rises quickly, it also subsides quickly with a change of wind, and does not make life miserable for days and days after a storm, as is the case in the deep sea."⁸

These thoughts lead to a consideration of the conditions which existed before the Ice age set in. G. Frederick Wright says: "From Maine and Puget Sound to the arctic archipelago and Greenland, the abundant long and branching fiords of these northern regions, and the wide and deep channels

⁶ *Geological Magazine*, 1882, p. 400.

⁷ "The Great Ice Age," 3d ed., p. 786.

⁸ "The White World," p. 254.

dividing their islands, attest a very long time of pre-glacial high elevation there.”⁹

The same author says of this flooded continent, in connection with its bearing on the distribution of species, that “the polar projection of the earth down to the northern tropic shows to the eye—as our maps do not—how all the lands come together into one region, and how natural it may be for the same species, under homogeneous conditions, to spread over it. When we know, moreover, that sea and land have varied greatly since these species existed, we may well believe that any ocean-gaps, now in the way of equable distribution, may have been bridged over. There is now only one considerable gap.”¹⁰

Again our author remarks: “Asa Gray and others have shown that the affinity of the plants of southern Greenland with those of Europe is such as to make it probable that they emigrated directly from Europe, rather than by the longer route across Asia and North America. Davis Strait seems to have been a more effectual barrier to the emigration of plants than was the North Atlantic on the east of Greenland. This would imply that the elevation of the bed of the North Atlantic is more certainly proved, or that it was longer continued than that of Davis Strait or Baffin Bay; or possibly it may prove simply that, from being freer of ice, it was more available for the passage of plants and animals.”¹¹

Yet one more citation from this great glacialist may be pardoned. He says: “From the geographic distribution of animals, not less than of plants, abundant evidence is found that in a late geologic time, probably comprising the closing stage of the Tertiary era and the early part of the Quaternary until the Ice age, an extensive land area occupied the present place of Behring Strait and Sea, upon which the

⁹ “Greenland Icefields and Life in the North Atlantic,” p. 320.

¹⁰ “The Ice Age in North America,” 4th ed., p. 379.

¹¹ “Greenland Icefields and Life in the North Atlantic,” p. 369.

fauna and flora of the northern lands freely migrated from Europe and Asia to America, and the reverse, becoming nearly alike in these two great continental regions. Over all the circumpolar land expanse the mammoth, mastodon, and many other large animals roamed from the United States to Alaska, Siberia, Continental Europe, and the British Isles during late Tertiary times.”¹²

In an editorial comment on “Where Did Life Begin?” N. H. Winchell says: “In several of his chapters Dr. Warren directs attention to the conditions favoring the commencement of life at the pole. See p. 59. Wallace (quoted by Warren) shows that ‘the facts of arctic paleontology call for the supposition of a primitive Eocene continent in the highest latitudes.’ Professor Heer of Zürich noted the same. Baron Nordenskjöld arrived at the same conclusion. J. Starkie Gardner argued from the facts known then (1878) that continuous land once united Europe and North America. This arctic continent, whether it was that which was submerged by the ocean that covered northern Asia, as shown by Professor G. F. Wright, in late Glacial or post-Glacial time, or was that which gave birth to the great glaciers of the Glacial epoch, subsisted through the Tertiary, since fossil Tertiary land plants, indicating warm and moist climates, have been found at numerous points within the Arctic circle. Given this continent and the tropical warmth that its fossils denote, the great preponderance of light over darkness, the intensity of direct, continued sun’s rays, and the conditions were favorable for the most luxuriant, if not for spontaneous, life. It is now a well-known doctrine of fossil botanists that the oldest land plants of the earth originated in the region of the North Pole and from there spread southwardly. This evolution toward the south continued. That the Arctic region was the birth place of plants and continued to send

¹² *Ibid.*, p. 215.

her progeny southward until the close of the Tertiary has been demonstrated by Gray, Heer, Hooker, Kuntze, Saporta, and others.

“With the existence of such a continent at the North Pole, and with the demonstrated stream of migratory plant life emerging from it, the author does not fail to inquire as to the evidence of animal origin in the same region. He quotes Orton (1876) and Wallace (1876) to the effect that the north temperate and Arctic regions have been the starting-points of long continued migrations, and concludes this branch of his inquiry in the following words: ‘From all the facts, but one conclusion is possible, and that is that like as the Arctic pole is the mother region of all plants, so it is the mother region of all animals—the region where in the beginning God created every beast of the earth after its kind, and cattle after their kind. And this is the conclusion now being reached and announced by all comparative zoölogists who busy themselves with the problem of the origin and prehistoric distribution of the animal world.’”¹³

It is not assumed in our hypothesis that the origin of life was at the pole, but simply that the canopy introduced conditions favorable to development and distribution from that point. It gives a reason for the many apparent anomalies in the distribution of living beings in time and space. The facts show this much, and the greenhouse roof explains the facts. The conditions were recurrent with the appearance of each successive canopy.

Warren’s central idea of sun-controlled climates is all wrong. Manson’s theory of earth-controlled or canopy-controlled climates approaches the truth, but this roof must be broken up into separate belts, otherwise the whole earth was encompassed by a mantle of cloud, a separate cause has

¹³ *American Geologist*, vol. xxxiii, No. 3, March, 1904; Wm. F. Warren, “Paradise Found”; G. Hilton Scribner, “Where Did Life Begin?”

to be found to account for the subsidence of the Arctic continent, the evolution of exogens remains unexplained, and finally the recurrence of similar polar conditions in different geological ages makes the idea untenable. For these reasons the content of the atmosphere could not have formed the blanket.

In this connection Chamberlin and Salisbury have put the following on record: "An atmosphere so heavily surcharged with carbon dioxide and water-vapor must have been rich in heat-absorbing power, and should have given a very warm, equable climate to the earth, as has been rightly assumed. Warm equable climates did indeed prevail in *a portion* of the earlier history of the earth, as also in the later; but the investigations of the past two decades in India, Australia, and South Africa have forced the recognition of extensive glaciation *on the very border of the tropics*, at a period as early as the closing Paleozoic. Evidences of glaciation in northwestern Europe, and also in China in about 30° N. lat., at or near the base of the Cambrian, has recently been presented. Less striking but perhaps not less significant is the occurrence in the early Paleozoic, of extensive salt and gypsum beds in rather high latitudes. These deposits seem to imply severe and protracted aridity, and such aridity, especially where north of the 30° belt, is not readily reconcilable with an enormous equalizing atmospheric envelope.

"There seem, therefore, to have been, in Paleozoic times, much the same alternations of very uniform with very diversified climates that marked the Mesozoic and Cenozoic eras; in other words, the alternations of climate seem to have been of much the same order throughout the known eras. The hypothesis of an enormous original atmosphere suffering gradual depletion finds, therefore, but scant and uncertain support in a critical study of either the biological or the physical history of the earth." ¹⁴

¹⁴ Geo., vol. ii, pp. 87-88.

It is hardly necessary to state that like conditions existed at the South pole, and that this section also testifies that the atmospheric content could not have been the controlling factor of the climates. The zoögeographical distributions establish the fact of the land connection, and science has even gone so far as to name this Antarctic continent. In the Permian it was known as Gondwana Land, and it is said to have embraced Brazil, India, South Africa, and Australia. No doubt the causes which brought about the destruction of the North polar continent were the same that brought about its destruction. In a future chapter we will show that the action in both hemispheres was contemporaneous. This coincidence of time, and the fact of equatorial glaciation, exclude the Adhemar-Croll hypothesis.¹⁵

During the Cretaceous, Australia and South America were united.¹⁶ In the Quaternary the continent appears to have again been enlarged to the wide limits it had in Permian time.¹⁷

"If the land extensions and connections in the Southern Hemisphere in the Permian period be made as slight as biological data permit," say the joint authors of Chamberlin and Salisbury's *Geology*, "they would probably at least consist of a connection from India, *via* Australia and the old submerged land, to New Zealand, and thence to Antarctica, and through this to South America. Other and more northerly connections between India and South Africa, and between the latter and South America, have usually been postulated."¹⁸

¹⁵ Charles Schuchert, *Journal of Geology*, vol. xiv, No. 8, p. 725. See also vol. xiv, No. 2, pp. 81-90; Dana, "Manual of Geology," 4th ed., pp. 737, 873, 937.

¹⁶ Dr. W. D. Matthew, "Outlines of the Continents in Tertiary Times," Map No. 1.

¹⁷ James D. Dana, "Man. of Geo.," 4th ed., p. 1019.

¹⁸ Vol. ii, pp. 675-676.

These conditions were followed by periods of cold just the same as in the Northern Hemisphere. The records as revealed to date are as follows: "In New Zealand the marks of the Glacial period are unequivocal. The glaciers which now come down from the lofty mountains upon the South Island of New Zealand to within a few hundred feet of the sea then descended to the sea-level. The longest existing glacier in New Zealand is sixteen miles. One of the ancient moraines contains a boulder from thirty to forty feet in diameter, and the amount of glacial *débris* covering the mountain-sides is said to be enormous. Reports have also been recently brought of signs of ancient glaciers in Australia.

"According to Darwin, there are distinct signs of glaciation upon the plains of Patagonia, sixty or seventy miles east of the foot of the mountains, and in the Straits of Magellan he found great masses of unstratified glacial material containing boulders which were at least one hundred and thirty miles away from their parent rock; while upon the island of Chiloe he found embedded in 'hardened mud' boulders which must have come from the mountain-chains of the continent. Agassiz also observed unquestionable glacial phenomena on various parts of the Fuegian coast, and indeed everywhere on the continent south of latitude 37° . Between Concepcion and Arauco, in latitude 37° , Agassiz observed, near sea-level, a glacial surface well marked with furrows and scratches, and as well preserved, he says, 'as any he had seen under the glaciers of the present day.'"¹⁹

¹⁹ G. Frederick Wright, "Man and the Glacial Period," 2d ed., pp. 126-128.

CHAPTER IX

CAUSE OF THE ICE AGES

THE cause of the ice inundations, up to this time, has remained locked in the bosom of nature. Nearly all the hypotheses advanced in explanation of the phenomena may be grouped under the following heads: (1) the astronomic, which call upon influences from outside the earth; (2) the hypsometric, those which appeal to continental elevation; (3) the atmospheric, those depending upon the constitution and movements of the earth's gaseous envelopes.

Croll's semi-astronomic hypothesis,¹ founded on the variations in the eccentricity of the earth's orbit and the precession of the equinoxes, is dead. The greatly exaggerated estimate of the time element kills it. Croll placed the close of the last glacial epoch as 80,000 years ago, which, in the light of modern discovery, is simply preposterous. Later modifications which bring the last stages of the ice down to within ten thousand years are also open to question.

The phenomena connected with the ice invasion seem to have been practically universal, even the elevated areas in the tropics being glaciated. Here once more Croll's theory, that the glacial epochs in one hemisphere coincided with the interglacial epochs in the other, and *vice versa*, is sadly wanting. This same reason also rules out the epeirogenic or elevation theory,² and Sir Charles Lyell's oscillations between the continents and oceans, and all other hypotheses founded

¹ "Climate and Time in Their Geological Relations," also "Climate and Cosmology," by James Croll; "The Cause of the Ice Age," Sir Robert Ball; and "The Great Ice Age," James Geikie.

² G. Frederick Wright, "The Ice Age in North America," p. 573 ff. James D. Dana, *Man. of Geo.*, 4th ed., p. 978.

on changes in the distribution of land and water, together with the hypothesis of a shifting polar axis. In this connection the following citation from Le Conte is to the point. He says:

“The more important element in the glacial problem is the cause of the lower temperature. The fact of Permian glaciation in low latitudes, either side of the equator, rules out the astronomic hypothesis, and continental elevation alone is insufficient. But a sufficient cause of secular changes of temperature, affecting the whole earth alike, is found in the *variation in amount of the carbon dioxide of the atmosphere.*”³

The true cause, then, should be sought in or above the atmosphere, but, as already intimated, a uniform blanket will not do, and to this we may add, neither will variation in the amount of carbon dioxide answer, for if depletion brought on the cold, then evaporation would have been less. Cyclonic action and precipitation would have been at a minimum. In other words, the idea that cold alone is responsible for bringing about glacial conditions is like killing the goose which lays the golden eggs. “It is perfectly manifest,” remarks Tyndall, “that by weakening the sun’s action, either through a defect of emission or by steeping of the entire solar system in space of a low temperature, we shall be cutting off the glaciers at their source.”⁴

Carbon dioxide in the atmosphere makes a uniform blanket, depletion makes the air more transparent to reflected heat (dark heat). The blanket once thinned, the temperature falls, the moisture decreases, and for this reason conditions are not good for an ice age; but nevertheless, as stated above, the true cause should be sought in the atmosphere, or, more correctly, in the regions immediately above the atmosphere.

³ Elements of Geo., 5th ed., p. 617.

⁴ “Heat Considered as a Mode of Motion.”

Step by step now let us follow the on-coming of the Glacial epoch and its explanation as revealed by the present hypothesis. Previous to the period of cold, we have seen that the warm climates did actually exist everywhere north of the Arctic circle, and a canopy was postulated as existing up to the boundaries of the polar regions. The warm temperatures originating under this roof are further supposed to have drifted out over the open space of the north, carrying with them a temperate climate almost to the pole itself. At this time the vegetation of central Europe and of the Middle Atlantic States of America flourished in northern Greenland and in Spitzbergen.

It is not assumed that the blanket which existed outside or above the atmosphere was of any great degree of thickness; on the contrary, it was probably exceedingly thin. Yet its influence was such that it prevented the free radiation of heat, and thus it caused the secondary belts of vapor to be raised in the atmosphere itself. Now, since the primary canopy was upheld by centrifugal force, and since this force was at a minimum at the axis of rotation, it follows that, as it spread beyond the point of stability, its northern edge must have been subjected to a continual depletion.

It is postulated on the strongest scientific grounds that as the canopy aged it lost energy, hence this point of stability retreated further and further south, and the great secondary vapor belts withdrew with it. Natural sun-controlled climatic conditions then began to appear in its wake, and the average temperature became cooler and cooler.

Picture now the descent and dispersal of the forests adjusted to a temperate climate. The tropical forms were forced to migrate southward, and this made room for the downward march of the inhabitants of Greenland and Spitzbergen to more hospitable latitudes. A single tree is helpless before such a change in environment, since a tree alone cannot migrate. But a forest of trees can, hence they followed the

retreating canopy, keeping under it or just beyond its confines, according to the conditions to which they were best suited. As the favorable conditions near the pole were disturbed, the individual trees on that side of the forest-belt gradually perished, but at the same time new territory was continually being invaded southward.

The first changes in the climate, then, were not of a sudden nature. But conditions were rapidly ripening for an ice age. On the one hand vast belts of vapor circled in the lower atmosphere of the middle zones; on the other the open space of the north had expanded to such an extent that the warm currents from the south could no longer maintain an even temperature. In other words, the north was becoming a condensing area, and the arctic flora and fauna began to descend into the cloudy debatable region.

Charles Darwin says: "The identity of many plants and animals on mountain-summits, separated from each other by hundreds of miles of low-lands, where Alpine species could not possibly exist, is one of the most striking cases known of the same species living at distant points, without the apparent possibility of their having migrated from one point to the other. It is indeed a remarkable fact to see so many plants of the same species living on the snowy regions of the Alps or Pyrenees, and in the extreme northern parts of Europe; but it is far more remarkable that the plants on the White Mountains, in the United States of America, are all the same with those of Labrador, and nearly all the same, as we hear from Asa Gray, with those on the loftiest mountains of Europe."⁵

Sir Charles Lyell gave as an explanation of the commingling of arctic and southern forms of animal life his opinion that the periods of summer and winter were more strongly contrasted. The fact of this commingling must have

⁵ "Origin of Species," vol. ii, p. 92.

greatly troubled Sir Charles, as he was the great exponent of the doctrine of uniformity.

But let us take up once more the thread of the on-coming of the Ice age. When the northern limit of the canopy had retreated to, say, the 35° of north latitude, and the corresponding edge in the south had withdrawn to the 35° of south latitude, the condensing area as portrayed above was represented by the middle ground between the pole and the canopy belt.

The great masses of cloud undoubtedly reduced the average summer temperature. Chamberlin and Salisbury recognize the potent influence of such persistent cloud and wind factors, but to account for these same factors is as difficult a problem to them as the original puzzle. Having shown how these originated under the influence of the canopy, it is interesting to see what the joint authors have to say about what they call the Proximate hypotheses. We therefore quote them as follows:

“In the atmospheric class of hypotheses are to be reckoned two that are proximate but not ultimate hypotheses: namely, the cloud hypothesis and the wind hypothesis. Without doubt, clouds and wind are important factors in the development of glaciation, but if clouds are made the essential factor, the problem is only shifted to the cause of such persistent clouds covering such large areas for tens of thousands of years consecutively, with a cooling potency competent to develop the great ice-sheets. The solution of this seems as formidable as the problem in its usual form.”⁶

The united effect of persistent cloud and wind conditions was the lowering of the snow line, probably some several thousand feet, and thus all the conditions became favorable to the rapid accumulation of the ice. It has been estimated that a lowering of the average temperature of the globe from

⁶ Geo., vol. iii, p. 445.

5° to 8° C. below the present temperature would be sufficient to produce general conditions of glaciation.⁷

"Prof. Shaler has warned us that New England at the present time barely escapes glacial conditions. The rudiments of a glacier still remain in Tuckermann's Ravine upon Mount Washington. A slight lowering of temperature or a slight increase of snowfall would again start the glaciers of the White Mountains out upon their career, and when once started, it is difficult to tell where they would stop; for glaciers intensify the conditions to which they owe their origin, and would seem to have almost unlimited power when once the forces producing them have come fully into play. Equally close is the approach to glacial conditions in Norway and Alaska."⁸

The circumstances, then, preëminently favoring the introduction of the Ice age, were all present when the canopy had receded to say the 35° of lat., abundant moisture was in the atmosphere, and climatic conditions favorable to the precipitation of this moisture as snow rather than as rain prevailed. Once these heavy falls exceeded the melting capacity of the sun's rays, there arose an annual addition to the ice-sheet. "Snow locks up, as it were, the capital upon dry land, where, like all other capital, it becomes conservative, and resists with great tenacity both the action of gravity and heat." Professor Wright analyzes these cumulative effects and he further says:

"Under the influence of heat ice melts, but in melting it consumes an enormous amount of force. In order to melt one cubic foot of ice, as much heat is required as would heat a cubic foot of water from the freezing-point to 176° Fahr., or two cubic feet to 88° Fahr. To melt a layer of ice a foot thick will therefore use up as much heat as would raise a

⁷ *Ibid.*, p. 444.

⁸ G. Frederick Wright, "Greenland Icefields and Life in the North Atlantic," p. 377.

layer of water two feet thick to the temperature of 88° Fahr.; and the effect becomes still more easily understood if we estimate it as applied to air, for to melt a layer of ice only one and a half inches thick would require as much heat as would raise a stratum of air eight hundred feet thick from the freezing-point to the tropical heat of 88° Fahr. We thus obtain a good idea both of the wonderful power of snow and ice in keeping down temperature and also the reason why it takes so long a time to melt away, and is able to go on accumulating to such an extent as to become permanent.”⁹

The importance of the cold polar currents, furnishing, as they did, the cold dry air necessary to cause precipitation, must not be overlooked. The path which these currents took was established by the same laws that exist to-day, hence the cyclonic areas cover the same ground. Persistent clouds and fog, habitual to such conditions, formed and shielded the glacial surface by their high reflecting powers, hence all the auxiliary forces of nature may be said to have fallen into line, doing their share to promote the general glacial conditions.

The next point that attracts our attention is the centres of distribution. The localization of these show that they occupied areas of permanent atmospheric depression. There is a remarkable correspondence between the border of the ice-sheets and the course of the movement of storms to-day. In other language, the atmospheric conditions were simply exaggerated. The extremes were greater, but the cyclonic paths of the storms were the same. It is notable that the great ice-lobes converged toward the area where storm-frequency is now greatest. The canopy established the mechanical factor which produced the vapor, and as this was fixed geographically the cyclonic area also became fixed, instead of moving with the atmosphere as the familiar stray

⁹ “The Ice Age in North America,” 4th ed., p. 406.

cyclones do. It seems natural; therefore, that their paths should have been approximately the same then as now.

This conception provides for the precipitation of the vapors brought into existence by a fixed mechanical agency, and it gives a reason for the low temperature that caused this precipitation to be in the form of snow. In Siberia, as at present, the average precipitation should have been relatively low, therefore the conditions never quite reached the glacial stage; nevertheless, it is probable that great floods swept over that land. A glance at the map of North America shows that the glacial centres were somewhere in the vicinity of Lake Superior and Labrador. Chamberlin and Salisbury remark that:

“It is not a little remarkable that the ice-sheets after their several retreats, and perhaps entire disappearances, should have advanced repeatedly in nearly the same forms and to nearly the same extents, though in some particulars their habits otherwise were noticeably unlike. All these and many minor facts are associated in theory with these permanent ‘lows’ and the related storm-tracks. These features are presumed to have been extended and intensified during the glacial stages, but to have retained the general relations and configurations they now possess.”¹⁰

From the standpoint of the present hypothesis, it does not appear remarkable that the several ice-sheets should have occupied nearly the same identical region. A machine turns out the same results simply because it is mechanical, and the canopy was to all intents and purposes a fixed feature. Fluctuations in the declining edge of the canopy, causing it to advance further north or retreat further south, are probably answerable for like advances and retreats of the ice-sheets. The recognition of these recessions and advances is of much more importance than the question whether they are to be regarded as distinct glacial epochs.

¹⁰ Geo., vol. iii. p. 433.

Here is another feature. Wright says: "It must be confessed that Professor Dana's estimates of the size of the Connecticut River floods at that time are somewhat startling, even with all the changes of level for which he provides in his theory. For, after reducing, by reason of the Champlain depression, the gradient of the stream during the close of the Ice period by one third, the slope of the surface of the Connecticut would still have been more than one foot per mile. This, in a torrent 2,500 feet wide, with a depth of 140 feet, would produce a current of eight miles per hour on the surface and of six miles on the bottom. With this size of the flood, the rate of discharge would be about four hundred cubic miles of water per annum; whereas, at the present time the total discharge of a year is only about five cubic miles. To cause this enormous rate, Professor Dana supposes that, for a short period, the Connecticut glacier melted at the rate of more than a cubic mile per day. As he estimates the area of this drainage-basin to be about 8,500 square miles, this would imply that at times as much as eight inches per day melted from this surface. This rapid rate of removal in summer is not, however, supposed to continue for a long period—probably less than five years."¹¹

James Geikie, speaking of certain interglacial beds, tells us that they "are of the very highest interest, since their evidence amounts to a demonstration that the Ice age was not one long uninterrupted period of cold conditions."¹²

Vegetation sometimes grew up to the edge of the ice. Remains are found in the drift. The mere presence of this material *in situ* between beds of drift is no proof of distinct glacial epochs, for this growth may have occurred during a temporary retreat, and a slight advance of the ice may have buried it beneath more drift. It is proof, however, that the

¹¹ "The Ice Age in North America," 4th ed., pp. 306-307. *American Journal of Science*, vol. cxxiii, 1882, p. 198.

¹² "The Great Ice Age," 3d ed., p. 129.

climate on the border of the ice was not so cold after all. A slight advance of the canopy bringing this perpetual summer warmth over the edge of the glacier caused floods such as that pictured by Dana.

Forest remains, found under like conditions as those above portrayed, not only show the presence of this warmth, but also that the periods of fluctuation were sometimes of considerable length.

"Among the most remarkable of the interglacial forest beds are those near Toronto. Among the identifiable plant remains are those of the pawpaw, the ash, the elm, the oak, and the yew. Most of these species now range as far north as Toronto, but most of them have their greatest development farther south. The pawpaw is not known so far north. It flourishes in the latitude of the Ohio River, ranging thence north to Lake Erie. At the present time these species as a whole seem to belong to the climate of a latitude somewhat lower than that of Toronto. Their testimony is that the climate of Toronto, during the interval of deglaciation when they grew, was somewhat warmer than that of the present time in the same locality. Toronto is 800 miles or more from the centre of the Labrador ice sheet."¹³

Because of this evidence of heat, the joint authors of the New Jersey publication arrive at the following conclusion: "The temperate climate which the plant remains prove makes it clear that the ice sheet which existed north of Toronto at that time must have been small, for with no ice sheet there at the present time, the climate is less warm than during the interval of deglaciation when the plants grew.

"It is of significance to note that the phenomena of America are in keeping with those of Europe on this point. * * * The remains of land animals are often found in the forest beds or at corresponding horizons. Their significance

¹³ "Glacial Geology of New Jersey," vol. v, Final Report, pp. 171-172.

is similar. At Toronto, for example, animal remains are found, and, like the plants, they indicate a temperature warmer than that of the same region at the present time.”¹⁴

It has been shown by the migrations of the plants and animals that the on-coming of the Ice age was gradual, but there are likewise features of suddenness. Thus the burial of entire mammoths by a mighty storm, and just such storms must have taken place. The swirling power of the canopy may at times have set the atmospheric belts themselves in motion, and the latter carrying the moisture laden vapors must have caused deluges and snows that at times were of cataclysmal magnitude. Winchell says:

“If the change to an arctic climate had been gradual, the herds of mammoths would probably have slowly migrated southward; or, if no actual migration occurred, the extinction of the mammoth population would have been distributed over many years, and the destruction of individuals would have taken place at temperatures which were still insufficiently rigorous to preserve their carcasses for a hundred ages. Whole herds of mammoths must have been overwhelmed by a sudden invasion of arctic weather. Some secular change produced an unprecedented precipitation of snow. We may imagine elephantine communities huddled together in the sheltering valleys and in the deep defiles of the rivers, where, on previous occasions, they had found that protection which carried them safely through wintry storms. But now the snow-fall found no pause. Like cattle overwhelmed in the gorges of Montana, the mammoths were rapidly buried. By precipitation and by drifting, fifty feet of snow, perhaps, accumulated above them. They must perish; and with the sudden change in the climate, their shroud of snow would remain wrapped about them through all the mildness of the ensuing summer. The fleecy snow would become granular;

¹⁴ *Ibid.*, p. 172.

it would be *névé* or *firn*, as in the glacier sources of the Alps. It would finally become solid ice,—compact, clear and sea-green in its limpid depths. It would be a glacier; and so it would travel down the gorges, down the valleys toward the frozen ocean, sweeping buried mammoths bodily in its resistless stream. Thus, in the course of ages, their mummied forms would reach a latitude more northern than that in which they had been inhumed.”¹⁵

The mammoth may have found the physical conditions under the canopy insupportable, or, again, it may be that the extinction of this great beast may best be accounted for by saying, it was his intelligence that killed him. Elephants are acknowledged to be the most knowing animals, and the mammoth belongs to this family. Looking at the lowering skies to the south, perhaps he feared to explore the only region which would have meant safety, whereas other creatures, of less intelligence, rushed blindly in and so came into possession of the garden-land. The mammoths’ stay in the debatable land resulted in their being overcome “*suddenly*.”

One of the difficult problems in connection with the cause of the Ice age has always been to account for the remarkable fact that the greater part of Alaska, the extreme North, and also portions of Greenland, were not extensively glaciated during Pleistocene time.¹⁶ Our explanation is that the gradual withdrawal of the canopy did not allow of the formation of ice-sheets in the far north. The area of precipitation followed the outer rim of the canopy, and until this had descended into the lower latitudes the clear space of the north was not large enough to allow of the radiation of suf-

¹⁵ “Sparks from a Geologist’s Hammer,” pp. 244-245.

¹⁶ Israel C. Russell, “Glaciers of North America,” pp. 139, 144-145. James D. Dana, “Man. of Geo.,” 4th ed., p. 977. G. Frederick Wright, “Greenland Icefields and Life in the North Atlantic,” pp. 206-207, 369-370. Chamberlin and Salisbury, Geo., vol. iii, pp. 329-330, 336-337.

ficient heat to cause the vapors from the south to turn to snow. When this point was finally reached the area of precipitation was south of the arctic circle. The fact here clearly stated proves conclusively that the cause of the Ice age was some other than the gradual lowering of temperature, such as might have been brought about by a depletion of the carbon dioxide of the atmosphere, or by elevation of the continental masses. The distribution of the ice during the Glacial period was not such as to indicate a gradual extension of it from the north pole, but rather its accumulation upon centres many degrees to the south.

There was a northern limitation and there was a southern limitation. The continental ice belts reached 40° of latitude. If no influence existed to prevent the cold from this region descending southward, it would seem certain that it would have done so. Sympathetic glaciation would surely have reached the equator. All tropical vegetation would have been exterminated. Since it was not, it follows that a preventive cause must have existed. The survival of innumerable tropical plants shows that the Glacial age was not a period of universal cold.

Now, the preventive cause of southern invasion was the belt of tropical or semi-tropical heat girding the earth under the greenhouse roof at about the 35° of latitude. At first this canopy formed one blanket from the 35° of south latitude to a like latitude in the north, but as time went on it is further postulated that the sky cleared at the equator, leaving a northern and a southern belt. Under these conditions the high lands between the belts also became somewhat glaciated. Thus the hypothesis we are considering accounts for a vast storehouse of heat, where vapor was formed, which in turn furnished the material for deluges of rain and great storms of snow. Accumulation of ice north of the protected belt established the ice-sheets, and at a much later period local glaciation began to appear on the mountains to the south.

The cold and warm zones, brought thus into juxtaposition, gave rise to cyclonic convulsions upon a scale which the ordinary operations of nature cannot begin to parallel.

The final breaking up of the belt caused the sympathetic glaciation above referred to to invade the whole earth. As an illustration of how this would have occurred, it is interesting to know that "the small precipitation in Greenland—commonly stated to be only about ten inches annually on and near the coast—renders it quite probable that if the ice were once melted away, it would not, under present conditions, accumulate again."¹⁷ We have already quoted the same author as saying:

"Under the influence of heat ice melts, but in melting it consumes an enormous amount of force. In order to melt one cubic foot of ice as much heat is required as would heat a cubic foot of water from the freezing-point to 176° Fahr., or two cubic feet to 88° Fahr. To melt a layer of ice a foot thick will therefore use up as much heat as would raise a layer of water two feet thick to the temperature of 88° Fahr.; and the effect becomes still more easily understood if we estimate it as applied to air, for to melt a layer of ice only one and a half inch thick would require as much heat as would raise a stratum of air eight hundred feet thick from the freezing-point to the tropical heat of 88° Fahr. We thus obtain a good idea both of the wonderful power of snow and ice in keeping down temperature, and also the reason why it takes so long a time to melt away, and is able to go on accumulating to such an extent as to become permanent."¹⁸

James Geikie says: "Every one, indeed, has heard of the heat of the arctic sun, which shines day and night during the whole summer-tide. But despite the sun's power the

¹⁷ Wright, "Greenland Icefields and Life in the North Atlantic," p. 367.

¹⁸ "The Ice Age in North America," 4th ed., p. 406.

mean temperature of summer in North Greenland does not exceed one or two degrees above freezing-point, and this is entirely owing to the presence of snow and ice.”¹⁹

We can understand from these citations how it was that glaciation reached the tropics. When the canopy finally dispersed it was like removing a wall or dam which had stopped or held in check the cooling currents which obtained their low degree of temperature from the vast accumulations of ice to the north, and which had already invaded the lower latitudes. The duration of this southern glaciation, however, was short-lived. The sun got in its work in time to save the tropical forms of life, but not in time to prevent the migration of certain arctic species from the one zone to the other.

In connection with the fact of the migration of arctic species, Sir Robert Ball tells us that “we have the high authority of Sir J. Hooker for the remarkable fact that a great number of the flowering plants in Patagonia are either identical with or closely allied to plants in temperate North America and Europe. To realize the significance of this fact, consider not so much that Patagonia and Northern Europe are separated by thousands of miles of land and sea, as that between them lies the torrid zone, in which these plants adapted to temperate regions could not live. There is no continuity between the flora of Patagonia and that of North America, for equatorial America is a barrier through which such organisms could not pass. How, then, are we to explain the community of botanical forms in two regions so remote? It is impossible to believe that these separate floras can have sprung independently into being, for all analogies of nature demonstrate that they must have had some common source. The glacial theory is at hand to render an explanation of the facts.”²⁰

¹⁹ “The Great Ice Age,” 3d ed., p. 800.

²⁰ “The Cause of an Ice Age,” p. 146.

Ball supported the Crollian hypothesis, and his explanation of these facts is not very satisfactory. T. G. Bonney, along with many others, tells us that "the extension of the glaciers on Mount Kenya (19,500) is specially interesting, because its position (almost on the equator) suggests a possible refrigeration of the earth as a whole rather than of its hemispheres alternately. Formerly its glaciers descended to a height of about 9,800 feet above sea-level, or their end was about 9,700 feet vertical beneath the summit, instead of about 4,000 feet, as at present. Kenya, in those days, must have presented conditions generally corresponding with those of a peak in the Alps rising to a height of about 14,000 feet (where the snow-line is about 8,000 feet, or 6,000 below the summit). On Kenya formerly this line should have been not far from 13,500 feet above the sea, and its present level must be about 15,000 feet; a difference which roughly corresponds with a lowering of temperature amounting to 5° ."

That which is true of the recent Pleistocene glaciation is likewise true of those which occurred in remote geological ages. "Evidence has been adduced from the Carboniferous times," says Archibald Geikie, "to support the view that in spite of the genial temperature indicated by the vegetation there were glaciers even in tropical and sub-tropical regions. Coarse boulder-conglomerates and striated stones have been cited from various parts of India, South Africa, and eastern Australia, as evidence of ice-action."²¹

²¹ Geo., 3d ed., p. 809.

CHAPTER X

SYMPATHETIC FEATURES

THERE were a great many other sympathetic features connected with the Ice age upon which the present hypothesis throws light. H. W. Pearson's views relative to the drift-wood origin of coal, accounting for, as they do, the remains of the plants grown *in situ*, might be transferred bodily into this volume.¹ Both hypotheses, though they are as far apart as the east is from the west, in their primary conceptions, recognize the fact that the ice caused the inundations required to accumulate the vast deposits of the Carboniferous, and is responsible also for the phenomenon of the raised beaches of the several geological ages involved.

These views have been held more or less definitely by many others. Thus, Professor Penck "thinks it likely that the pluvial periods, of which there is evidence in many of the deserts of the world, were contemporaneous with ice-advances, and that desiccation phenomena accompanied interglacial epochs."²

The phenomena of desiccation seem to have been first cousins of the pluvial manifestations. We would point out that no other hypothesis than the one now before us can explain how it is that within a range of a few hundred miles these two extremes should be contrasted, and yet there is geological evidence to show that such were the actual conditions.

Frederick S. Dellenbaugh says of the Grand Canyon of the Colorado that "the inner gorge appears to have been cut far more rapidly than the outer one, and at a much later

¹ *Scientific American Supplement*, No. 1683, April 4, 1908.

² *Geographical Journal*, Feb. 1906, pp. 182-187. *The Journal of Geology*, vol. xiv, No. 6, Sept.-Oct., 1906, p. 570.

period. Were this not the case, there would be no inner gorge. It is a singular fact that some side canyons—the Kanab, for example—while now possessing no running water, or at best a puny rivulet, and depending for their corrasion on intermittent floods, meet on equal terms the great Colorado, the giant that never for a second ceases its ferocious attack. * * * A suspicion arises, on contemplating some of these apparent discrepancies, that the prevailing conditions of corrasion are not what they were at some earlier period, when they were such that it was rendered more rapid and violent; that there was perhaps an epoch when these deep-cut tributary canyons carried perennial streams, and when the volume of the Colorado itself was many times greater, possessing a multiplied corrasive power, while the adjacent areas were about as arid as now.”³ Dellenbaugh, who was one of the members of Major J. W. Powell’s second expedition, undoubtedly correctly surmises that the cause of the additional corrasive power was increased precipitation on the mountain summits during the Glacial epoch. We might add, the result of the sympathetic glaciation. The significant point is that the region of the canyons, according to the evidence, was then as arid as at present. The inference is obvious: the region in question lay under the protecting belt, hence, though great quantities of moisture were in the air, geologically speaking the area was one of desiccation.

Like conditions naturally prevailed in the remote geological ages when other belts caused other glaciations. Thus the problems of the Permian are summed up by Chamberlin and Salisbury, and we would point out that desiccation under the canopy belt existed then just as it existed in the Pleistocene. The joint authors say:

“Between a marvelous deployment of glaciation, a strangely dispersed deposition of salt and gypsum, an extra-

³ “The Romance of the Colorado River,” pp. 46-47.

ordinary development of red beds, a decided change in terrestrial vegetation, a great depletion of marine life, a remarkable shifting of geographic outlines, and a pronounced stage of crustal folding, the events of the Permian period constitute a climacteric combination. Each of these phenomena brings its own unsolved questions, while their combination presents a plexus of problems of unparalleled difficulty. More than any other period since the Cambrian, the Permian is the period of problems. With little doubt these marked phenomena were related to one another, and their elucidation is quite sure to be found in a common group of coöperative agencies. While it is too much to hope for a full elucidation at once, there is no occasion to blink the facts or evade the issues they raise.”⁴

Evaporation is akin to desiccation, and this took place under the zonal belts. Precipitation occurred in the open zones, outside the influence of the protecting canopy. Under these conditions salt deposits could be formed in one region while in an adjacent territory torrential floods were accomplishing their work.

As this hypothesis has no occasion to evade an issue raised, the phenomena of crustal folding and kindred questions next attract attention. Undoubtedly they were of a sympathetic nature, elucidation of the one great cause opening the way for a discussion of the coöperative agencies.

According to Professor G. Pozzi, the principal volcanic outbreaks of Italy are of the Glacial period.⁵ Professor Wright says: “The connection of lava-flows on the Pacific coast with the Glacial period is unquestionably close. For some reason which we do not fully understand, the vast accumulation of ice in North America during the Glacial period is correlated with enormous eruptions of lava west of the Rocky Mountains, and, in connection with these events,

⁴ Geo., vol. ii, pp. 655-656.

⁵ Atti Linci, 3d ser., vol. ii (1878), p. 35.

there took place on the Pacific coast an almost entire change in the plants and animals occupying the regions." ⁶

The same author says of the columnar outflows of basalt of Disco Island and contiguous and more northern islands along the Greenland coast: "The date of these lava outflows was approximately the same with similar or even grander volcanic action in the Farøe Islands, Iceland, and the region of the Cascade Mountains in Oregon and Washington." ⁷

Chamberlin and Salisbury give the following summary of the evidence in America: "There are lava-flows and cinder cones of Quaternary age in New Mexico, Colorado, Utah, Nevada, Oregon, Idaho, Washington, and at various points in the Sierras. On many of them vegetation has hardly begun to gain a foothold. Gilbert estimates that of 250 lava fields observed in these states 15 per cent. are of Pleistocene age, and of the 350 volcanic cones in the same States, 60 per cent. are considered to be Pleistocene. Volcanic ash is interbedded with loess at various points in eastern Washington and Oregon, and overlies glacial moraines in some parts of Alaska. Glacier Peak, Washington, is the remnant of a volcano formed after the elevation of the base-leveled tract. Mount Rainier dates from about the same time." ⁸

Associated as these instances were with the Glacial period, there can be no doubt that the redistribution of the land, caused by the heaping up of the ice, was the proximate cause.⁹ The ice depressed the Champlain valley about 200

⁶ "Man and the Glacial Period," 2d ed., p. 301.

⁷ "Greenland Icefields and Life in the North Atlantic," p. 208.

⁸ Geo., vol. iii, p. 479.

⁹ N. S. Shaler, "Depression of the Terrestrial Surface Caused by Accumulation of Ice-Sheets." Proc. Boston Nat. Hist. Soc., xvii, p. 288. T. F. Jamieson, Quart. Journ. Geol. Soc., 1882, and *Geol. Mag.*, 1882, pp. 400, 526. Fisher, "Physics of Earth's Crust," p. 223. A. Geikie, Geo., 3d ed., p. 295. G. Frederick Wright, "The Ice Age in North America," 4th ed., pp. 368, 369, 573, 576, 586, 595, 616, 618.

feet, and it is generally conceded that the whole St. Lawrence region must have stood some hundreds of feet lower than now. Where did the crushed out or displaced strata go?

"These relations between the amount of post-glacial elevation and the centre of the icefield have led to the hypothesis (1) that the low altitude of the land at the close of the last glacial epoch was the result of sinking caused by the great load of ice, and that the sinking was greatest where the ice was thickest; and (2) that the rise of the land since the glacial period is the result of the removal of the load of ice, and that the resilience was greatest where the depression was greatest, namely, where the ice was thickest. This hypothesis, which makes the crust of the earth responsive to load, is the doctrine of *isostasy*.

"Attempts have been made to test this hypothesis in various ways. The result of all investigations thus far carried out seems to point to the conclusion that it contains a truth, and that load, or the removal of load, affecting a great area, is a real cause of crustal movement. It is not to be inferred, however, that this responds promptly or uniformly to it. It is probable that other forces originate crustal oscillation, or may limit, delay, or defeat the movement which load or its removal would tend to produce."¹⁰

After the ice disappeared the ocean invaded the Champlain depression, but, the load having been removed, the land began to return to its normal elevation. "The conclusion that the northern lands were lower than now when the ice melted carries with it the farther conclusion that the land has since risen, relative to the sea level. Much other evidence, gathered from a wide range of territory, points to the same conclusion. Not only this, but the post-glacial rise of the land seems to have been greater, as the centre of the icefield is approached, and amounts to as much as 1,000 feet

¹⁰ "Glacial Geo. of N. J., vol. v, Final Report, pp. 200, 201.

or more near the centre of the field.”¹¹ The time factor of this dynamic oscillation was certainly much faster than is generally realized.¹²

Load was only one of the proximate factors resulting from the atmospheric belts, that caused plutonic and other terrestrial disturbances. All the most pronounced manifestations of vulcanism occurred at periods when the belted canopy was undergoing some form of change. Thus during the Tertiary vast floods of lava were poured out in both the Old and the New Worlds. Going still further back, like phenomena mark the later parts of the Cretaceous, and it is the same story in the still more remote ages.¹³ The immediate cause of these outbreaks was undoubtedly the weight of ice and the pressure of the atmosphere. But these factors only acted on the critical region (anamorphic zone) of rock flowage. Be it remembered we advocate a rigid earth.

Archibald Geikie, in this connection, says: “Leaving for the present the general question of the cause of volcanic action, it may be here remarked that the conditions determining any particular eruption are still unknown. The explosions of a volcano may be to some extent regulated by the conditions of atmospheric pressure over the area at the time. In the case of a volcanic funnel like Stromboli, where, as Scrope pointed out, the expansive subterranean force within, and the repressive effect of atmospheric pressure without, just balance each other, any serious disturbance of that pressure might be expected to make itself evident by a change in the condition of the volcano. Accordingly, it has long been remarked by fishermen of the Lipari Islands that in stormy

¹¹ *Ibid.*, p. 200.

¹² For figures relative to this interesting phenomenon, see New York State Museum, Bul. 84, Geo. 8, pp. 236-238.

¹³ A. Geikie, *Geo.*, 3d ed., pp. 258, 973. James D. Dana, *Manual of Geo.*, 4th ed., pp. 299-300, 365-366, 392. Joseph Le Conte, *Geo.*, 5th ed., p. 525.

weather there is at Stromboli a more copious discharge of steam and stones than in fine weather. They make use of the cone as a weather-glass, the increase of its activity indicating a falling, and the diminution a rising, barometer. In like manner, Etna, according to Sartorius von Waltershausen, is more active in the winter months. Mr. Coan has indicated a relation between the eruptions of Kilauea and the rainy seasons of Hawaii, most of the discharges of that crater taking place within the four months from March to June.

“When we remember the connection, now indubitably established, between a more copious discharge of fire-damp in mines and a lowering of atmospheric pressure, we may be prepared to find a similar influence affecting the escape of vapors from the upper surface of the lava-column of a volcano; for it is not so much to the lava itself as to the expansive vapors impregnating it that the manifestations of volcanic activity are due. Among the Vesuvian eruptions since the middle of the seventeenth century, the number which took place in winter and spring has been to that of those which broke out in summer and autumn as 7 to 4. In Japan also the greater number of recorded eruptions have taken place during the cold months of the year, February to April. * * *

“The greater frequency of Japanese volcanic eruptions and earthquakes in winter has been referred in explanation to the fact that the average barometric gradient across Japan is steeper in winter than in summer, while the piling up of snow in the northern regions gives rise to long-continued stresses, in consequence of which certain lines of weakness in the earth's crust are more prepared to give way during the winter months than they are in summer.”¹⁴

¹⁴ Geo., 3d ed., pp. 205-206.

CHAPTER XI

RECENTNESS OF THE LAST STAGES OF THE ICE

THIS chapter is introduced to show that the last stages of the ice invasion were of such recent date that man, including even civilized man, was a witness of the grand phenomena of the belted canopy. The demonstration of this point is very important, as its establishment admits before the court the evidence locked up in the mythological tales, the fossil thought of those ancient days, which has come down to us as an echo. It is generally admitted by the scientists that man lived on the earth during the Pleistocene, therefore in a measure this chapter is unnecessary, but that the lay mind may find it easier to follow the argument, and that no link may be wanting, especially at such an important junction, it seems best to present a general outline of the evidence. Further, it may be well to state that remnants of the belts probably survived in the heavens long after the ice disappeared. Now, since man lived in the Pleistocene, he saw the system in its glory, and as it is assumed that remnants remained until a much later period, he saw the decline and fall of the same, the Ragnarok of his gods.

The popular idea that the Ice age occurred at a very remote date, humanly speaking, lives on in spite of the fact that science has controverted the data on which it was originally founded. Estimates of this character are based more or less on three worn-out theories: (1) Lyell's principle of uniformity in Nature's operations, which has led to an exaggerated estimate of the Glacial age, in order to proportion it to the other events in geologic time; (2) Croll's hypothesis of the precession of the equinoxes (now generally discredited); (3) Darwin's system of evolution, which requires

long periods of time for the development of new species from a parent stem. De Vries removes this difficulty, as his "mutants" fulfil all requirements for the shortening of the time element.

The data we are now after are those of the withdrawal of the last of the ice from the centre of glaciation. In one sense the age is not yet over; the glaciers, especially those of Alaska, are still receding. But this slow recession, while it shows that the date of heavy glaciation was recent, is of little value in the present connection, for it only demonstrates the tenacity with which cold stored up in the past has endured. It does not show that the cause itself still existed until recent time. In order to find out what this date may be, we want to determine the approximate date of the first withdrawal of ice from the southern border of the ice sheet. To that end we introduce the following testimony.

Prestwich places a rough estimate within the limits of 6,000 to 12,000 years as necessary for the wearing back along the coast-line of certain cliffs since the glacial submergence in the soft Cretaceous, Oölitic, and Liassic strata in the South of England.¹ The evidence from weathering in America confirms this. T. C. Chamberlin, State Geologist of Wisconsin, says: "No sensible denudation had taken place there since glacial times."²

H. Carville Lewis says in connection with the striæ on Cannon Hill, Kerry, Ireland: "At the present day the northwest winds are the wet winds. The winds were the same in the time of the local glaciers. The marks are so fresh that they may not be over 5,000 years old."³ "In Europe, likewise, numerous estimates of the lapse of time

¹ "On Certain Phenomena Belonging to the Close of the Last Geological Period, etc.," p. 71.

² Geo. of Wis., vol. ii, p. 632.

³ "The Glacial Geo. of Great Britain and Ireland," pp. 93, 94.

since the Glacial period, as collated by Hansew, are found to be comprised between the limits of 5,000 and 12,000 years." ⁴

Material comprising deposits of the Glacial age is very slightly oxidized and disintegration is very slightly advanced, even when said deposits occupy exposed positions. All this indicates that the lapse of time has not been long. The late Professor White, of the Pennsylvania Geological Survey, describes freshly preserved leaves at great depths which he found in terraces on the Monongahela River. He also describes a certain pebble which he found near the Big Sandy, and which is peculiarly liable to disintegration, nevertheless his specimens were in good condition. "There is not space to mention the many other places where wood is reported in the modified drift filling what are perhaps preglacial torrents, and which may therefore have been transported a long distance from their native place. One such was reported to me in the valley of Raccoon Creek, in Granville, Licking County, Ohio, and but a few miles from the glaciated border. This was found ninety-four feet below the surface of the terrace, which would bring it about forty feet below the present bed of the stream. A few miles farther up in this same valley so many red-cedar logs were formerly found beneath the glacial terraces along the valley, and the wood was so fresh, that a flourishing business was for a while carried on in manufacturing household utensils from them. Red cedar is not found in that region now, and these logs are probably of the same period with those described as found in true glacial till in Butler County, and which are so fresh as to preserve still the peculiar odor of the wood.

"Professor Collett reports that all through that portion of southwestern Indiana included within the glacial boundary there are found, from sixty to a hundred and twenty feet

⁴ *American Geologist*, vol. xxviii, No. 4, p. 243.

below the surface, peat, muck, rotted stumps, branches and leaves of trees, and that these accumulations sometimes occur through a thickness of from two to twenty feet.

"We may mention also, as probably connected with the period of the ice-dam at Cincinnati, the well-preserved organic remains found in the high-level terraces of various tributaries of the upper Ohio. In the vicinity of Morgantown, Professor I. C. White, as already noted, reports that in the terraces which he connects with the period of the Cincinnati ice-dam the leaves of our common forest-trees are most beautifully preserved some distance below the surface, and that logs of wood in a semi-rotted condition were encountered seventy feet below the surface."⁵

Very little erosion has taken place since the Kames of Scotland or America were deposited, and in both these localities these peculiar relics of the Glacial period retain their sharpness of outline. "When, also, one considers the chemical agencies at work to decompose the rocks everywhere protected by a covering of till, the freshness of the glaciated surfaces never ceases to be a cause of astonishment. * * *

"Closely connected with the preceding class of facts are the observations made upon the extent to which the lakes, dating from the Glacial period, have been filled with sediment. Little reflection is required to make it evident that our present lake-basins could not always have existed; for, except where counteracting agencies are at work, the 'wash' of the hills will in due time fill to the brim all inclosed areas of depression. Mr. Upham, of the Minnesota Geological Survey, expresses surprise at the small extent to which the numerous lakes of that State have been filled with the sediment continually washing into them. 'The lapse of time since the Ice age has been insufficient for rains and streams to fill these basins with sediment, or to cut outlets low enough

⁵ "The Ice Age in North America," 4th ed., p. 493.

to drain them, though in many instances we can see such changes going forward.'⁶

"Dr. E. Andrews, of Chicago, has made calculations, deserving of more attention than they have had, concerning the rate at which the waters of Lake Michigan are eating into the shores and washing the sediment into deeper water or toward the southern end of the lake.⁷ The United States Coast Survey have carefully sounded the lake in all its parts, and have ascertained the width of the area of shallow water extending inward from the shores. It is well known that waves are limited in their downward action, so that there will be a surrounding shelf, or shoulder of shallow water, in cases where the waves of a deep lake are eroding its banks. This fringe of shallow water encircling Lake Michigan is only a few miles wide; and from such data as have been gathered, the average rate of erosion is found to be as much as five or six feet per annum; which would indicate that the lake-basins had not been in existence more than seventy-five hundred years."⁸

The author from whom we have just quoted enters into a lengthy discussion of the date of the Glacial period,⁹ from which we cite the following:

"Seven thousand years may, with a good deal of confidence, be taken as the age of the lower part of the Niagara gorge. This, of course, does not take us back to the period when the front of the glacier lay in the headwaters of the Delaware and the Little Miami River, and when glacial floods were depositing the gravel at Trenton, New Jersey, and at Loveland and Madisonville, Ohio, and where Drs. Abbott and Metz have found paleolithic implements; but it does bring us back to within a comparatively short distance of that period,

⁶ Minnesota Geological Report for 1879, p. 73.

⁷ *American Journal of Science*, vol. xcviii, 1869, pp. 172 *et seq.*

⁸ Wright, "The Ice Age in North America," 4th ed., pp. 470-471.

⁹ *Ibid.*, pp. 448-505.

the difference being merely the time necessary for the melting back of the ice from the summit of the Catskills to the southern flanks of the Adirondacks, and from the water-partings of the Ohio to the north shore of Lake Erie.

"A second typical place for the study of the recession of post-glacial waterfalls is presented in the gorge of the Mississippi River below the Falls of St. Anthony at Minneapolis. The problem here presented has been carefully studied by Professor N. H. Winchell, the State Geologist of Minnesota, who thinks he can pretty closely approximate to the truth concerning its antiquity." The average arrived at for these calculations is 7,803 years.¹⁰

"The Falls of St. Anthony," says Le Conte, "recedes about five feet per annum, and has made its gorge in about 8,000 years."¹¹

Warren Upham arrives at a somewhat earlier date, though the region on which he founds his conclusion is farther north. He writes: "Likewise probably the uprise of the St. Lawrence basin was at first relatively rapid, so that it all might take place within the period of about 7,000 or 6,000 years which is indicated for Postglacial time in that part of the northern United States and Canada by Prof. N. H. Winchell, in his studies of the recession of the Falls of St. Anthony, with which my studies of the Niagara falls and gorge well coincide. The former estimate of the period since the Ice age as tens of thousands of years, still advocated by Gilbert and Woodworth, is opposed by a great range of well accordant evidence on the glacial areas of both North America and Europe."¹²

"These calculations concerning the age of Niagara and the Falls of St. Anthony are amply sustained by the study of various minor waterfalls and gorges in Ohio, to which I have

¹⁰ *Ibid.*, pp. 458, 464.

¹¹ *Elements*, 5th ed., p. 15.

¹² *American Geologist*, November, 1905, vol. xxxvi, No. 5, p. 288.

myself given special attention," says Wright. "For example, at Elyria, twenty-five miles west of Cleveland, Black River plunges over the outcropping Waverly sandstone, and flows onward to the lake through a wide valley in the Erie shale, which was doubtless preglacial, though no buried channel above has yet been discovered. The gorge below the falls, which has been eroded since glacial times, and which approximately represents the work done by Black River during that time, is only a trifle over two thousand feet long. The water flowing over the falls represents the drainage of about four hundred square miles, and the sandstone which forms the precipice over which the water plunges is underlaid by soft shale very favorable to rapid erosion."¹³

Warren Upham in "Popular Astronomy" gives the following data, which ably summarize what has already been said. He remarks: "In various localities we are able to measure the present rate of erosion of gorges below waterfalls, and the length of the postglacial gorge divided by the rate of recession of the falls gives approximately the time since the Ice age. Such measurements of the gorge and falls of St. Anthony by Prof. N. H. Winchell show the length of the Postglacial or Recent period to have been about 8,000 years; and from the surveys of Niagara Falls, Prof. G. F. Wright and the present writer believe it to have been 7,000 years, more or less. From the rates of wave-cutting along the side of Lake Michigan and the consequent accumulation of sand around the south end of the lake, Dr. E. Andrews estimates that the land there became uncovered from the ice-sheet not more than 7,500 years ago. Prof. Wright obtains a similar result from the rate of filling of kettle-holes among the gravel knolls and ridges called kames and eskers, and likewise from the erosion of valleys by streams tributary to Lake Erie; and Prof. B. K. Emerson, from the rate of

¹³ "The Ice Age in North America," 4th ed., p. 466.

deposition of modified drift in the Connecticut Valley at Northampton, Mass., thinks that the time since the Glacial period cannot exceed 10,000 years. An equally small estimate is also indicated by the studies of Gilbert and Russell for the time since the highest rise of the Quaternary lakes, Bonneville and Lahontan, lying in Utah and Nevada, within the arid Great Basin of interior drainage, which are believed to have been contemporaneous with the great extension of ice-sheets upon the northern part of our continent. * * *

"In Wales and Yorkshire the amount of denudation of limestone rocks on which boulders lie has been regarded by Mr. D. Mackintosh as proof that a period of not more than 6,000 years has elapsed since the boulders were left in their positions. The vertical extent of this denudation, averaging about six inches, is nearly the same with that observed in the southwest part of the Province of Quebec by Sir William Logan and Dr. Robert Bell, where veins of quartz marked with glacial striæ stand out to various heights not exceeding one foot above the weathered surface of the inclosing limestone.

"Another indication that the final melting of the ice-sheet upon British America was separated by only a very short interval, geologically speaking, from the present time, is seen in the wonderfully perfect preservation of the glacial striation and polishing on the surfaces of the more enduring rocks. Of their character in one noteworthy district, Dr. Bell writes as follows: 'On Portland promontory on the east coast of Hudson's Bay, in latitude 58° and southward, the high rocky hills are completely glaciated and bare. The striæ are as fresh-looking as if the ice had left them only yesterday. When the sun bursts upon these hills after they have been wet by the rain, they glitter and shine like the tinned roofs of the city of Montreal.'

"From this wide range of concurrent but independent testimonies, we may accept it as practically demonstrated that

the ice-sheets disappeared from North America and Europe some 6,000 to 10,000 years ago.”¹⁴ Upham also remarks: “Niagara history may be placed in round numbers between 5,000 and 10,000 years.”¹⁵

In the Final Report of the State Geologist of New Jersey the following concise statement occurs: “The date and duration of the glacial period are matters of the greatest interest, but neither has been determined with numerical exactness. Many lines of calculation, all of them confessedly more or less uncertain, point to the retreat of the last ice-sheet from the northern part of the United States 6,000 years to 10,000 years ago. While these figures are to be looked upon as estimates only, there are so many lines of evidence pointing in the same direction that the recency (geologically speaking) of the last glaciation must be looked on as established.”¹⁶

Humphreys and Abbot estimated that the whole delta of the Mississippi had been laid down in 5,000 years.¹⁷ De Lanoye gives but 6,350 years for the making of the delta of the Nile.¹⁸

The recentness of the date of the waning of the ice having been established, a few citations are now given to show that man’s relics have been found in widely dispersed regions in formations of said period, and also that deductions founded on this assumption are borne out by the facts of ethnology.

“Geologic archæology in Europe demonstrates,” says Warren Upham, “man’s existence there before the culmination of the Glacial period, and indeed, I think, before its beginning. From my examination of the implement-bearing gravel deposits of the Somme valley in northern France, where the proofs of man’s great geologic antiquity were first

¹⁴ *Scientific American Supplement*, No. 1588.

¹⁵ *American Geologist*, vol. xxviii, No. 4, p. 243.

¹⁶ Vol. v, *Glacial Geo.*, p. 194.

¹⁷ Humphreys and Abbot, *Report on the Mississippi River*, 1861.

¹⁸ De Lanoye, *Ramsés le Grand ou l’Egypte il y a 3300 ans*, trans., New York, 1870.

recognized and published, I conclude that Paleolithic men began their occupation of that country before the epoch of great elevation of the lands which became glaciated, probably contemporaneously, in both Europe and North America.”¹⁹

Frederick S. Dellenbaugh says: “There has been an error, I believe, in considering the Glacial period as of the remote past. It does not seem to have yet closed. It influences our climate now, and probably a thousand years ago its meteorological effects were marked as far south as Yucatan. The glaciers of the Northern Hemisphere everywhere appear to be slowly disappearing, and not so slowly either, if the Muir can be taken as a gauge, for it has been for twenty years receding at the rate of 500 feet per annum, and probably at the same rate before that. However this may be, it is probably less than 5,000 years since the ice front was at Lake Erie. Eminent geologists have estimated it at less than 7,000, based on the erosion at Niagara; but as the erosion immediately following the disappearance of the ice is extremely rapid, it seems safe to cut down the estimate.”²⁰

Dellenbaugh is so sure of the recentness of the Ice age that he advances the following argument on that stone for a foundation. He reasons: “That the continent was entirely peopled by way of Behring Strait within the last thousand years, by migration through a zone of ice, is improbable. To assume that a population came over and passed down to Mexico and Yucatan and even South America, carrying with them their arts, but not exercising them on their interminable journey, is ridiculous. No pottery has yet been found between the Yukon and the Humboldt, or even farther south, probably because the Eskimo learned what little they knew about it while in the St. Lawrence Valley or the Atlantic region.”²¹

¹⁹ *American Geologist*, vol. xxii, pp. 350–363; vol. xxviii, p. 251.

²⁰ “The North Americans of Yesterday,” Preface, p. xi.

²¹ *Ibid.*, p. 428.

Our author again says: "How the Amerinds came here, I explain by a theory that there was before, or perhaps during the early part of, the Glacial period, a wider distribution of land surfaces on latitudinal lines, which invited migrations. These land surfaces may have been no more than groups of larger or smaller islands which have been since wholly submerged or have left only their highest parts above the sea. Before the beginning of the glacial cold a mild climate extended to the North Pole, facilitating migrations also in that region. Changes in the ocean's bottom were probably greater in preglacial time than now, but they have not altogether ceased. It is little more than fifteen years since a new island appeared off the Aleutian chain, and I think it is doubtful if any of that group existed above water six or eight hundred years ago. I am also of the opinion that no human life was in Alaska or in northeast Siberia five hundred years back.

"Races not being all of an even grade of culture before the beginning of the cold period any more than now, the tribes that found themselves isolated on this continent by changes in the land levels and by the southward extension of the glaciation, were unevenly developed, some being in advance of others in various ways, though none, of course, had passed beyond the use of stone tools, a condition in which they practically continued down to the Discovery. In this respect the term 'Stone Age,' as indicating a condition, is applicable, but it would not be possible to differentiate it into 'Paleolithic' and 'Neolithic' periods. The cold pushed them all southward, whether they came by northlands or by latitudinal lands, or both, towards the narrow, funnel-like part of the continent, and also to the lower levels, as there was no chance for latitudinal expansion as in the Eastern Hemisphere, the most advanced tribes being the most southerly, if not from original position, because they were able to choose. Eventually communication with Asia and Europe

by the north was by the glaciation severed completely, as it had previously been latitudinally by the disappearance of favorable land surfaces, and communication by the north remained closed till within three or four hundred years. The most crowded tribes developed most rapidly, because such development was imperative for self-preservation, and their culture filtered through in diminishing ratio, according to distance, to the less crowded regions—that is, to the climatically less favorable regions; but all who were closely crowded in the ‘funnel’ progressed along similar lines and in much the same degree, *without regard to relationships*, so that we find in the narrow part of the continent, where the largest number found refuge from the cold, many different stocks in parallel ‘areas of characterization,’ as in the latitudinally broader lands of the Eastern Hemisphere, though in some cases there were slight barriers tending to produce or maintain slight variations. The long longitudinal chain of the Sierra Nevada abounding in glaciers to a late date, and to a less extent that of the Rocky Mountains, brought about a partial isolation of the stocks in the great north-and-south migrations, maintaining previous differences and originating others, so that we now distinguish differences between what is called the Pacific group, while they are yet practically the same. The tribes farthest advanced at the beginning of the isolation on this continent would not necessarily continue at the front of progress, for a change of conditions that might cripple such tribes might at the same time be beneficial to others previously inferior. For instance, as the heat gradually returned, the highly developed lowland tribes began to find themselves at a disadvantage, which grew with the intensity of heat, while others, inured to harsher conditions, found warmth stimulating, and they began to develop germs received from the superior but now declining stocks. ‘The American Indians,’ says Brinton, ‘cannot bear the heat of the tropics even as well as the European.’ The heat, which at first seems to

have been intense in the daytime, then caused a decline of the highest stocks, and a corresponding progression of lower stocks existing on, or migrating to, higher levels. The Yucatec tribes declined, while the Nahuatl, at higher altitudes, began to develop. The finest monuments of North American antiquity, for these reasons, are generally found on comparatively low levels and below a certain latitude, where conditions during the greatest cold were most favorable; conditions that may have continued fairly favorable down to within, say, a thousand years.

“Long before the dawn of the Columbian era, therefore, the Amerind peoples had become, through the influences indicated, a world-race by themselves, existing in various stages of the same general culture, and with a rising and a declining of tribes and stocks directed by environment and circumstances.”²²

Speaking of languages and dialects Dellenbaugh says elsewhere: “The widest differences were in the Maya and the Timuquanan. Each of these differed greatly from the bulk of the Amerind languages and from each other, probably because both stocks held more isolated positions than the others during the glacial period, and preserved more of their earlier life, whatever it may have been.”²³

It will now be interesting to see what this ethnologist says of the effects of the glacial age on the human race as a whole. Discussing this problem, he says: “The people inhabiting the world before it may have been originally much alike in kind and color, with local variations, and the isolation produced by glacial conditions modified this color and increased the variations, those finally left in hot lands becoming darker, medium temperatures producing brown, still cooler the reds and yellows, and the forests of Europe evolving a shade or

²² *Ibid.*, Preface, pp. viii-x.

²³ *Ibid.*, p. 17.

shadow people, shrinking from the strong sun; the so-called white race.”²⁴ The author of this work does not agree with these last conclusions of Dellenbaugh. Briefly rearranging the order according to his light, it would seem that the original color of the inhabitants of the world before the canopies fell was black; as time went on, and more especially towards the north, the browns, reds, and yellows developed, and then finally the Caucasian or Adamite race was evolved. The conditions arising from the fall of the heat-retaining canopies of course were the leading stimuli which fostered these changes.

After these long citations from Dellenbaugh, by way of contrast we will indulge in a few shorter ones, that by the mouth of several witnesses these things may be established. G. Frederick Wright says:

“The evidence of man’s existence in North America before the close of the Glacial period would indicate that he too shared in the sharp struggle which ensued with the new and rapidly changing conditions of that time. Did he also, like so many of his companions among the larger animals, share in this extinction? The sharpness of the transition from paleolithic to the neolithic implements, as we pass out from the Trenton gravel into the shallow soil above it, would seem to indicate an absolute distinction between the two succeeding races.”²⁵

“The geological succession of events,” says J. W. Foster, “as disclosed by the Danish discoveries, would appear to be after the following order: The Reindeer Epoch had closed, and the animals fitted for an Arctic climate, which formerly roamed over France and almost to the shores of the Mediterranean, had retired to the far north, before the earthen tumuli and shell-heaps and other relics of human occupancy

²⁴ *Ibid.*, p. 435.

²⁵ “The Ice Age in North America,” 4th ed., p. 568.

had been erected; and were succeeded by a fauna now indigenous to the region. On the land, changes in the character of the arborescent vegetation were going on. The pine—associated with the oldest stone implements, and on whose buds the capercailzie fed—gave place to the oak—associated with bronze implements—which in turn gave place to the beech—associated with iron implements, the predominant type of vegetation at this time. Thus, this succession in climatic changes corresponded very closely with the archæological changes of the ages of Stone, Bronze, and Iron, bringing down the record to the Historical Period.”²⁶

James Geikie tells us that “no relics of Paleolithic man have been detected anywhere in Northern Europe in beds of later date than the accumulations of the third glacial epoch. Implements, etc., of Neolithic age, on the other hand, make their first appearance on a much higher horizon. They occur in the older beds of peat, but never in the clays with arctic plants which underlie the peat-bogs. It would seem, then, that Neolithic man did not appear in Northern Europe until the cold of the fourth glacial epoch was passing away.”²⁷

Since Paleolithic relics have been found, we have direct proof that man lived on the earth before the last belts, which caused the last glacial and interglacial periods, had dissipated. “It is interesting to know that relics of Paleolithic Man have been found in the same deposits with remains of mammoth, woolly rhinoceros, horse, wapiti, etc., near Irkutsk. The relics consisted of rudely worked bones, coarse objects of burnt clay, one of which was pyramidal in form and ‘holed’ for the obvious purpose of being fixed to a shaft, while the point was worn and blunted as if from use.”²⁸

²⁶ “Prehistoric Races of the United States of America,” 6th ed., p. 40.

²⁷ “The Great Ice Age,” 3d ed., pp. 499–500. G. Frederick Wright devotes a whole chapter to evidence of this kind. “The Ice Age in North America,” 4th ed., p. 506, ff.

²⁸ Geikie, “The Great Ice Age,” 3d ed., p. 704.

It is interesting to know that the same story comes from Africa. There they had a pluvial period almost within Historic time, as the accompanying evidence shows: "The exploration of the Sahara daily yields unexpected discoveries; and already fifteen different stations formerly inhabited by man have been made out. In those remote days a large river flowed near Wargla, which was then an important centre, and a number of tools picked up bear witness to the former presence of an active and industrious population. At one place the flint implements, arrow-heads, knives, and scrapers are all of a very primitive type, and were found sorted into piles. This was evidently a *dépôt*, probably forming the reserve stock of the tribe. Wargla, or perhaps Golea, at one time appears to have been the extreme limit of the Stone age in Algeria, but quite recently traces of primitive man have been discovered amongst the Tuaregs." ²⁹

The Egyptologist, A. B. Edwards, tells of a dry river somewhere between Wady Sabooah and Maharrakeh. Here she found the ruins of a comparatively modern town, whose location led her into the following speculation. She says:

"Supposing yonder town to have been founded in the days when the river was a river, and the plain fertile and well watered, the mystery of its position is explained. It was protected in front by the Nile, and in the rear by the ravine and the river. But how long ago was this? Here apparently was an independent stream, taking its rise among the Libyan mountains. It dated back, consequently, to a time when those barren hills collected and distributed water—that is to say, to a time when it used to rain in Nubia. And that time must have been before the rocky barrier broke down at Silsilis, in the old days when the land of Kush flowed with milk and honey." ³⁰

²⁹ The Marquis de Nadaillac, "Manners and Monuments of Pre-historic Peoples," trans. Nancy Bell (N. D'Anvers), p. 32.

³⁰ "A Thousand Miles up the Nile," p. 362.

"The hippopotamus is found in the Nile, Niger, Senegal, and most of the larger rivers of South Africa, between which stretch vast areas where no individuals of the animal have ever been found—regions untenable by reason of their aridity; but here, as in the case of the chamois, there can be no doubt that a migration or diffusion did take place at a time when the physical aspects of the country were favorable for such a dispersion, and were, consequently, different from what they are at present." ³¹

Professor Sayce says of the period immediately succeeding the close of the old Egyptian empire with the sixth dynasty, and the rise of the eleventh: "Profound changes have taken place when the veil is once more lifted from Egyptian history. We find ourselves in a new Egypt: the seat of power has been transferred to Thebes, the physical type of the ruling caste is no longer that of the Old Empire, and a change has passed over the religion of the people; it has become gloomy, introspective, and mystical; the light-hearted freedom and practical character that formerly distinguished it are gone. Art, too, has undergone modifications which imply a long age of development: it has ceased to be spontaneous and realistic, and has become conventional. Even the fauna and flora are different; and the domestic cat, imported from Nubia, for the first time makes its appearance in the threshold of history." No doubt the increased cold resulting from the break-up of the Ice age started the Hyksos invasion. It must be remembered that the effects of the Ice age have not yet entirely disappeared from our climate, and that when the protecting belt which was the immediate cause of the great storms that heaped up the snow over North America and Europe passed away, then these storms descended into the south country. Thus for a long

³¹ Angelo Heilprin, "The Geographical and Geological Distribution of Animals," p. 21.

time after the belt had dissipated, its removal disturbed the genial climate of the heretofore favored middle-lands. Probably most of the barbarian invasions resulted from this cause.

As a summary to all that has been said, two more citations may be pardoned: "Prof. James Geikie maintains that the use of paleolithic implements had ceased, and that early man in Europe made neolithic (polished) implements, before the recession of the ice-sheet from Scotland, Denmark, and the Scandinavian peninsula; and Prestwich suggests that the dawn of civilization in Egypt, China, and India may have been coeval with the glaciation of northwestern Europe."³² Winchell says: "There has been a time in the history of the Aryan family of men when they seem to have suffered from a sudden change of climate which compelled them to migrate southward. When we trace the movements of the European nations backward, we find, in the remote past, a point of divergence from the nations which crossed the Hindu-Kush into the peninsula of India. In Central Asia the ancestors of the Hindus, Iranians, and Europeans were one people. There arose the Brahmanic and Zoroastrian religions. But the sacred books of the latter contain allusions to a remoter time, when the ancestors of the Aryans dwelt in a country blessed with seven months of summer. This was Aryana-Vaêjo, a land of delight, given by Ahura-Mazda, and supposed to have been located in southern Turkestan, upon the Plateau of Pamir, or somewhat farther east in the beautiful valley of Cashgar. But lest this paradise should tempt all nations to crowd in and overpopulate it, the 'evil being, Angra-Mainyus (Ahriman), full of death, created a mighty serpent, and winter, the work of the Devas.' Now ten months of frost prevailed, succeeded by only two months of summer. Of this transformed region the *Vendidad* says:

³² G. Frederick Wright, "Greenland Icefields and Life in the North Atlantic," p. 339.

‘There is the heart of winter; there all around falls deep snow; there is the worst of evils.’ So the ancestors of the Zoroastrians migrated from Aryana-Vaêjo, or Old Iran, southward into New Iran, within the modern Afghanistan.

“Is there no analogy between the Aryana-Vaêjo of the Zend-Avesta and the Eden of the Hebrew sacred books? In both, the primitive home of the white race was a country of spontaneous productiveness and a delightful climate. Both lands were given by a beneficent Deity for human occupation. From both lands our ancestors were driven through the machinations of the Evil One. In both narratives the power of evil is personified in a serpent. The consequence in both narratives is the necessity of resort to cultivation of the soil for the production of bread. May both narratives be pictures reproducing from national memory the same encroachment of physical severities upon the same land of Edenic delights?”³³ In the future chapters of this work it will be seen that the vapor-belt in the sky was the great serpent.

³³ “Sparks from a Geologist’s Hammer,” 3d ed., pp. 245-246.

CHAPTER XII

FOSSIL THOUGHT

WITH apologies for taking such liberty with Shakespeare the following question is asked:

Doubt thou the stars are fire;
Doubt that the sun doth move;
Doubt; but at least inquire
What theory fits the groove.

Serpent worship was once a world-wide cult, and in Egypt this serpent was linked with Canopus (the canopy), who conquered the fire in the sky-ring (the sun) by his water-jar. Canopus was the Egyptian god of water, and was represented by the hieroglyphic of a water-jar, though sometimes a serpent was used in its stead. As the vapor-belt formed a secondary arc under the canopy, it was natural to associate it with water; hence the water-jar. It can readily be seen how our word "canopy" is derived from this serpent-net or covering. It comes to us through the Greek.

Leaving the thought of the serpent for the present, we find many references to the canopy; thus one of the maxims from Theognis the Megarean, translated by the Rev. J. Blank, M.A., reads as follows:

"Then may the broad brazen vault-of-heaven fall on me from above, that terror of men of the olden-time, if I shall not help them indeed who love me: but be to my foes a vexation and great source-of-loss."

The same translated by J. H. Frere runs thus:

"Then let the brazen fiery vault of heaven
Crush me with instant ruin, rent and riven,
(The fear and horror of a former age,)
If from the friends and comrades that engage
In common enterprise I shrink, or spare
Myself or any soul! If I forbear
Full vengeance and requital on my foes!
All our antagonists! all that oppose!"

This brazen fiery vault was the sun, or "shiner," of the ancients; the true sun imparted its light to the fire belt, but was itself unseen. Herodotus tells of the account he heard from the Egyptians, how that for a period of ten thousand years none of the sky gods assumed the form of man. Speaking of the shiner, or, as he calls it, the sun, he says: "During this time, they related that the sun had four times risen out of his usual quarter, and that he had twice risen where he now sets, and twice set where he now rises; yet that no change in the things in Egypt was occasioned by this, either with regard to the productions of the earth or the river, or with regard to diseases, or with respect to deaths."¹

The early Aryans called "the vault" Varuna. Beneath it the region of clouds was enthroned. The light of luminous air they called Dyaus. The Greeks conceived the same idea of a hollow or concave vault, *Κοίλος*. Among the Latins the name *cælum* has the same signification. Thus we see how tenaciously the record of the facts survived the rise and fall of empires, even after their meaning had been forgotten.

Should we go back to the earliest days of the first Babylonian Empire, we would find that these matters which we are depicting were even then in a great measure only echo. On investigation, however, we would find the sound was very close, the echo was very loud and clear. We often tell children to count the seconds intervening between the flash of the lightning and the growl of the thunder, in order to estimate the distance. Applying this rule, we find in this instance a very short interval.

Rassam found in the ruins of Abû Habba a marble tablet, eleven inches and a half long by seven inches wide, covered with writing and adorned with a beautiful bas-relief on the top of the obverse. The subject represents Sippara, the god of the shiner, seated in his shrine, under the canopy. The

¹ Henry Cary's trans., B. 2, ¶ 142, p. 152.

significance of the fact is that the inscription gives instructions how the symbols are to be engraved, how they "are to be placed on a new image that may be made," "opposite the ocean, between the snake." The sun, Shamash, is outside the snake, but is pulled up over it by cords.²

At the time when this conception was born the true sun must have been seen dimly riding up above the body of the snake. The Egyptians beheld the same scene, and, according to the custom of the age, it became a part of their religion. They called the arc of the sky Nu or Nu-t and represented it by a female figure bending over Seb, the earth, who lay in a recumbent position. Nu-t's body was elongated in a very peculiar manner, her feet resting on one horizon and her finger-tips on the other. Over her arched back the sun-god traversed the sky daily from east to west in his boat. The vapor arc or halo which surrounded the dimly seen sun accounts for this myth. Sometimes Nu-t is represented as double. The upper bending figure being covered with stars clearly portrays her nature. She must have been nearly transparent. The lower Nu-t is evidently a band of water, which suggests the Hebrew idea of the firmament. The proximate cause of the formation of this vapor belt, we have seen, was the upper canopy. Seb, the earth, is represented covered with leaves.

When the canopy first began to split at the equator, dividing into the northern and southern halves, the Egyptians saw the two belts descending on the one horizon as the arms of Nu-t and on the other as the legs. Job speaks of these two divisions as "the pillars of heaven." He says: "They tremble and are astonished at His reproof. He divideth the sea with His power." * * * "He bindeth up the waters in His thick clouds; and the cloud is not rent under them."

² Herman V. Hilprecht, "Explorations in Bible Lands During the Nineteenth Century," pp. 269-271.

* * * "By His Spirit He hath garnished the heavens; His hand hath formed the crooked serpent." ³

The Hindus called these two belts the Acvins. At night they were seen as two pillars of light receiving the sun rays from the under-world. These were also the original Pillars of Hercules. As the vapors thinned out over the tropical region, the sun rose between the great pillars or divisions of Nu-t, and set between them again on the other side. And this sun was a blazing, flaming creature, a god, traveling in his halo boat.

When the fact is recalled that the sun was said by the ancients to set between the Pillars of Hercules, it will be granted that it was natural that when the sky scenes passed away, the twin rocks at the entrance of the Mediterranean came to inherit the name. Some may even have considered them the stumps out of which the sky-pillars grew. They were at the "world's end" to the Greeks, nothing but the all-encircling ocean-river lying beyond.

As we have seen, in Job "the pillars of heaven" are associated with the "crooked serpent." Hercules (the sun), when he took the place of the giant Atlas, supporting the heavens on his shoulders while the latter obtained the golden apples (stars) from the garden of Hesperides, is another account by a different people of the same thing. We can readily see the "Pillars" (Atlas) arising from the horizon and apparently supporting the heavens; the stars are discovered in its open rifts guarded by the dragon or serpent. Another name of the "Pillars" is the "World-Tree."

Serpent worship was universal. Frequently the myths tell of two serpents. These undoubtedly represent the two halves of the canopy, and the people who left the record lived on or near the equator, where both belts could be seen. When only one serpent is mentioned the people leaving the record

³ Job xxvi: 11, 12, 8, 13.

usually lived in the middle regions under the canopy or nearer the poles.

The infant Hercules (the new-born sun just bursting through the canopy) is said to have strangled two serpents with his own hands before he was out of his cradle (the vapor arc boat).

“First two dread Snakes at Juno’s vengeful nod
Climb’d round the cradle of the sleeping god;
Waked by the thrilling hiss and rustling sound,
And shrieks of fair attendants trembling round,
Their gasping throats with clenching hands he holds,
And Death untwists their convoluted folds.”⁴

It is said of the ancient Hindus that they must have known of yore that Saturn was encircled by rings.⁵ This assumption is made on the ground that an image in one of their temples represents the god Sani, or Saturn, intertwined by two wreathing serpents. It seems more likely that this image originally represented our own system, as the two snakes are certainly very suggestive of the two halves of the divided canopy.

The Persian legends tell us of a serpent-king called Zohak. He was a power for good until the demon Iblis kissed him on the shoulder. This seems to have been the place from whence the good emanated. On his shoulder, like in the story of Atlas, the world-roof rested. Thus when he was kissed in this spot there issued two dreadful serpents, and the golden age, with its Eden-like conditions under the canopy, came to an end. We will find a great many myths of this character as we go on with the study. The parting of the canopy brought with it death and destruction. In this particular instance Iblis told Zohak that the two dreadful serpents must be fed every day with the brains of two children. So the country gradually became depopulated. The end was to destroy the human race.⁶

⁴ Darwin. ⁵ Maurice, “Indian Antiquities.”

⁶ Poor, “Sanskrit Literature,” p. 158.

At Circleville, Ohio, some time ago, a very curious circular disc of stone, about a foot in diameter, was found. Around it was carved the figures of two intertwined serpents.

Bernal Diaz, who accompanied Cortez, stated that in one town whose buildings were of lime and stone they found "figures of serpents and idols painted upon the walls." The arms of the Peruvians were two serpents with their tails interlaced. At San Juan de Maguana, in the Island of Haiti, "curious relics of the aboriginal cult," says A. K. Fiske, "have been found, including a circle of stones roughly representing the emblem of eternity, in the form of a serpent with its tail in its mouth."⁷ Many such relics have been found elsewhere.

The usual form of the serpent myth, however, represents only one belt at a time. The Midgard Serpent occupied the local heaven, or middle world (middle heaven), of the Norseman. In Egypt, Apophis, the lofty serpent, reigned over the mighty water.

Archæological remains show the same veneration for this ubiquitous sky-serpent. Some of the new-world "finds" have already been referred to. "Some additional light appears to have been thrown upon ancient serpent worship in the West by the recent archæological explorations of Mr. John S. Phené, F.G.S., F.R.G.S., in Scotland. Mr. Phené has just investigated a curious earthen mound in Glen Feechan, Argyllshire, referred to by him, at the late meeting of the British Association in Edinburgh, as being in the form of a serpent or saurian. 'The mound,' says the *Scotsman*, 'is a perfect one.' The head is a large cairn, and the body of the earthen reptile 300 feet long; and in the centre of the head there were evidences, when Mr. Phené first visited it, of an altar having been placed there."⁸

⁷ "The West Indies," p. 252.

⁸ Ignatius Donnelly, "Atlantis," 21st ed., pp. 204-205.

In America the Mound Builders are comparatively a recent people. Their works overlies the formations of the Glacial age, but the existence of serpent worship amongst them indicates that there were still remnants of the old belted vapor system left in the sky when they inhabited the land. Probably the most famous monument left by them is that of the great serpent mound of Adams County, Ohio. This serpent has an egg in its mouth, which undoubtedly represents the sun in his vapor-arc, the boat of the Egyptians. Other groups of mounds also include the egg.

In the south the canopy divided, and the sun, appearing in the rift, seemed to conquer, but in the higher latitudes, in the middle regions, as it were, the belts slowly descending polewards seemed to swallow the orb of day as depicted by the serpent mounds. The Iroquois say that the White one, meaning the sun, was overcome by the frog monster, who swallowed him up. This tale is found on both sides of the Atlantic.

At Waukesha, Wisconsin, is a relic similar to the serpent mound of Adams County, Ohio. It is called by Lapham a "Turtle mound." Body, 56 feet, engulfing an egg; tail 250 feet; height 6 feet. The so-called "Lizard mounds" also occur here. They have remarkable curved tails. These long tails portray what their builders actually saw in the sky. And no doubt we here have the origin of that primeval serpent-worship found all over the world. First he was the good serpent, the protector, but as his aspect became menacing, with the passing of time, he became associated with the evil one. "In itself the serpent should no more represent moral wrong," says Donnelly, "than the lizard, the crocodile, or the frog; but the hereditary abhorrence with which he is regarded by mankind extends to no other created thing. He is the image of the great destroyer, the wronger, the enemy."⁹

⁹ "Ragnarok," p. 175.

A peculiarity about serpent worship was that it was quickly forgotten, being superseded by its successor in a few turns of the hour-glass; but this is as the present hypothesis requires, for when the hidden sun came into view he came as a conqueror and claimed all that adoration which once belonged to the snake. The slimy reptile which we all abhor to-day never could have commanded the veneration which we find was accorded it in the prehistoric age. The conclusion is obvious—

The snakes of old, that by all men were praised
Must have been grand as in the sky they blazed—
The people called them gods and stood amazed.

In India, Amanta, the good, who was the serpent of celestial waters, and who dwelt in the lower sky, was conquered by a supreme god, who lived above, on high. The Toltecs called their sky-god, Quetzalcoatl. “The *Popol Vuh*, the great collection of Quiche myths, presents Gukumatz as one of the four principal gods who created the world. Gukumatz means shining or brilliant snake, and hence seems to be the same character as that known to the Nahuatls, or Aztecs, as Quetzalcoatl, whose name means the bright or shining snake.”¹⁰

Quetzalcoatl was reputed to be a very good vapor spirit, a kind of coverer. He was the son of Camaxtli, the shiner of yesterday; that is, of a shining canopy or sun that had passed away. “He fought the enemies that had risen against his father, and attacked the temple of the Cloud-Snakes’ mountain.” * * * “He was tall, of white complexion.” His reign was the Golden Age of the Toltecs. He was pursued by enemies and obliged to fly. One of these was a near kinsman, a splendid youth, named Tezcatlipoca, the smoking mirror, whom we recognize as a canopy. This

¹⁰ F. S. Dellenbaugh, “The North Americans of Yesterday,” p. 397.

kinsman was his bitter enemy. "Quetzalcoatl was pressed from land to land. By some accounts he disappeared in a boat on the sea; by others he perished on the snow-covered peak of Orizaba (the Olympian cloud-mountain of the Aztecs), mounting to heaven on the smoke of the funeral pile. When he vanished the sun withdrew his shining."¹¹

In the museum down at Mexico an image of Quetzalcoatl is on exhibition which is girt about with snakes of very savage mien. Their peculiarity is that they are both bird and reptile, a kind of feathered flying serpent, indicating rapid flight. This idea of rapid flight is frequently associated with the White one, the illuminated and fleeting canopy, or perhaps rather with the true sun seen in his vapor-arc or boat passing rapidly over the canopy-sea.

Turning to the Arabian tales, the identity of thought with all that we have already set forth bespeaks a common origin of this class of nature myth. Thus, "Abou Mohammed the Lazy, who is a very great magician, with power over the forces of the air and the Afrites, beholds a battle between two great snakes, one tawny-colored, the other white. The tawny serpent is overcoming the white one; but Abou Mohammed kills it with a rock. The white serpent (the sun) departed, and was *absent for a while, but returned*; and the tawny serpent was torn to pieces and scattered over the land, and nothing remained of her but her head."¹²

The white one, or the egg in some of the myths, which was seen through the canopy was the sun. His foe was the glittering prince of serpents, the feathered serpent, etc. In the Bible there is the flying serpent: Isa. xiv: 29; Job xxvi: 13; Isa. xxvii: 1. The Aztecs represented their god, Tezcatlipoca, as a flying or winged serpent. Other myths represent the canopy as a dragon, while still others picture it

¹¹ Charles De B. Mills, "The Tree of Mythology," pp. 44, 45.

¹² Ignatius Donnelly, "Ragnarok," p. 268.

as a giant bird, a frog, a wolf, a dog, a boar, or as some other creature. The Hindu legends often represent it as a cow, and amongst all primitive people the deer and the hare are common. It must be remembered that the belts in falling advanced through several different stages, forming many different sky-forms, which were seen from a great many different angles, and by a great many different people. Speed seems to have impressed them all, hence the comparison with flying animals.

The belts as they drifted northward or southward broke into separate divisions. These were the immediate cause of the various stages of ice recession. Mythology is full of these broken and wicked forms—wicked because of the evil that they introduced on the earth; and sometimes these forms are called serpents. They were the hundred-armed giants, known as Typhon, Briareus, and Enceladus. Again, they were the three huge monsters, the terrible speckled serpent, Typhon, and Chimæra, the fire ring, a lion in front, a goat in the middle, and a serpent behind. Chimæra breathed resistless fire, and, like the speckled serpent, was huge, swift, and fierce. Typhon, associated with both of these, seems to have been the most terrible of all. This dreadful monster, born of Hell, was also a serpent or fierce dragon. He was many-headed, dusky tongues of fire gleamed throughout his body, and it was said that he emitted appalling noises and caused earthquakes.

The story told in the Typhon legend is found in the mythology of many peoples. In the Norse account we see the same threefold aspect, to wit, the three monsters called "the Midgard serpent," "the Fenris wolf," and lastly "the dog Gram." In the book of Job again we have the three divisions: first, the "winding" or "twisting" serpent, with which God "adorned the heavens"; then "Behemoth," the monster who drank up rivers; and finally the terrible "Leviathan," whose name means "the twisting animal gath-

ering itself into folds." The Saxon legend tells us how Beowulf killed savage monsters—Grendel, the devil's dam, and thirdly a dragon. Association of ideas recalls to our minds the three roots of the tree Ygdrasil, the three-pronged trident of Poseidon, etc., etc.

Says the Russian fairy-tale: "Once there was an old couple who had three sons. Two of them had their wits about them, but the third, Ivan, was a simpleton. Now, in the land in which Ivan lived there was never any day, but always night. This was a snake's doing. Well, Ivan undertook to kill that snake. Then came a third snake, with twelve heads. Ivan killed it, and destroyed the heads; and immediately there was bright light throughout the whole land. The myth is pushed on, and there is also the monster who devours maidens, called a 'Norka'; and Perun takes the work of Indra and Saint George, enters the castle (dark clouds), and rescues her. But the dark power takes a distinctive Russian appearance in the awful figure of Koshchei the deathless."¹³

This victory of the sun over the serpent is told by all primitive peoples. It is the victory of Adonis over Typhon, of Indra over Vritra, of Dimiriat over Dahish, of Timadonar over Ariconte, of Hercules over the two serpents strangled while he was still an infant; of Osiris over Seb, etc., etc.

"Pleasing was his shape,
And lovely; never since of serpent kind,
Lovelier; not those that in Illyria changed
Hermione and Cadmus, or the god
In Epidaurus, nor to which transformed
Ammonian Jove, or Capitoline, was seen."¹⁴

The serpent, as we have already seen, was not always lovely. In the early stages of canopy decline he was the dark and threatening one. The Peruvians tell of a certain hero named Guamansuri, who descended to the earth and

¹³ L. E. Poor, "Sanskrit and its Kindred Literatures," p. 390.

¹⁴ Milton.

seduced the sister of Guachemines, who was the rayless one, or the Darkling; that is to say, she was the Power of Darkness. The sister proved pregnant, and died in her labor, giving birth to two eggs, the sun and moon.

Again the Miztecs, who dwelt on the outskirts of Mexico, said: "In the year and in the day of obscurity and darkness, yea, even before the days or the year were (before the visible revolution of the sun marked the days, and the universal canopy prevented the distinguishing of the seasons), when the world was in great darkness and chaos, when the earth was covered with water, and there was nothing but mud and slime on all the face of the earth—behold a god became visible, and his name was the Deer, and his surname was the Lion-snake. There appeared also a very beautiful goddess called the Deer, and surnamed the Tiger-snake. These two gods were the origin and beginning of all the gods." ¹⁵

¹⁵ *Origen de los Ind.*, pp. 327-329.

CHAPTER XIII

GENESIS

IN the development of Christianity on its intellectual side, what is needed to-day is more synthetical work; it is often forgotten that parts only go to make up a whole. Separate truths go to make up one testimony, and that testimony is of the unity of truth, and nothing but the truth; it is the revelation of God in all and through all and above all, and all truth has its place somewhere in the scheme of this testimony. Truth cannot annihilate truth, hence we say, what is needed to-day is more synthetical work. Frederick Harrison has well said: "There never was an age so deeply intoxicated with specialism in all its forms as our own, so loftily abhorrent of anything systematic, so alien to *synthesis*, that is, organic coördination of related factors. Everything nowadays is treated in infinitesimal subdivisions. Each biologist sticks to his own microbe; each historian to his own 'period'; the practical man leaves 'ideas' to the doctrinaire, and the divine leaves it to the dead worldling to bury his dead in his own fashion. Specialism is erected into a philosophy, a creed, a moral duty, an intellectual antiseptic."¹

Now, as the various parts are brought together, we see that science and comparative theology, as recorded in the fossil rock and fossil thought handed down to us, unite harmoniously in the present cosmological hypothesis. Each shoemaker has been sticking to his own last, but it is now time to do the fitting, and the foot-gear should be in keeping with the whole dress of the man. The historian, the archæologist, the paleontologist, the anthropologist, the ethnologist,

¹ "Great Religions of the World," art. on "Positivism," p. 170.

the philologist, the mythographer, and the theologian, all need to get together.

The present hypothesis brings them together, and, furthermore, it sets its seal on God's revelation. God's created record and God's written record, Nature and the Bible, testify with one voice. And the written word is inspired by the Holy Ghost.

Proof that the Bible is inspired is set forth in the fact that its various parts were written in an unscientific age and yet they are scientific. For this reason theology, when it properly interprets the evidence, may be set down as an exact science. In an unscientific age a correct account of creation was written. Since the unknown has been revealed, why should not the unknowable of this age also be opened to the eyes of a future generation? Cicero says: "When you look upon a large and beautiful house, though you should not see the master and find it quite empty, no one can persuade you that it was built for the mice and weasels that abound in it." The plan of the universe is far too grand to suppose that it is "accident," therefore we are glad to say with the patriarch, "In the beginning God."

Let us look into this creation record. In Genesis i:1, there is a heaven mentioned which seems to be the same as the firmament heaven of verse 8. This is not to be understood to be the expanse above and around us, studded with innumerable stars, which is really infinite space, but a heaven that was according to the divine account "created." It was associated with the earth. God made heaven (Heb. *shamayim*, heaved up things) and earth. Jer. xxxii:17; Ps. xxxiii:6-9. This fact is forgotten to-day. II Pet. iii:3-6; Isa. xl:21-22. The necessity of some such interpretation as this was apparent to the early Church Fathers. St. Basil, St. Cæsarius, and Origen argued that the sun, moon, and stars existed from the beginning, but that they did not appear until the fourth day.

This heaven, or heavens, had an expansion or division in it (Gen. i: 6). The vapor belt was suspended, as we have seen in our scientific chapters, in the atmosphere under the canopy, and the Scriptures call them the waters which were under and which were above the expanse. Unless this account be based on fact, who would have ever risked his reputation to be sponsor for such a statement? Does the heaven look to us as though the blue arch were a few hundred feet high, and that on top of it are the clouds? Job says: "Dost thou know the balancings of the clouds, the wondrous works of Him which is perfect in knowledge? * * * Hast thou with Him spread out the sky, which is strong, and as a molten looking-glass?" ²

It has been demonstrated in our scientific chapters that the geological age-changes were brought about by the disruption of these vapor belts, or heavens. These broke the sequence in the chain of life. The great mutations occurred almost instantaneously, becoming established in a generation or so. Verily they were new "creations," and they occurred in a day.

The etymology of this word day "gives it the sense," says J. W. Dawson, "of the time of glowing or warmth, and in accordance with this the divine authority here limits its meaning to the daylight." ³ This is very puzzling to the Biblical student, for the nature of the context clearly shows that the natural day from sunrise to sunset is expressly excluded. Now, the period of duration for a canopy was a time of glowing and of warmth; it is therefore quite evident that the seven days of creation were seven ages of canopy light.

The diurnal period was divided into a time of light and of shade. The light of the sun shining through, and on, the overhanging canopy of water-vapors produced the greater

² Job xxxvii: 16, 18. ³ "The Origin of the World," p. 126.

light to rule the day and the lesser light to rule the night. "Bless the Lord, O my soul. O Lord my God, Thou art very great; Thou art clothed with honour and majesty. Who coverest Thyself with light as with a garment: Who stretchest out the heavens like a curtain: Who layeth the beams of his chambers in the waters: Who maketh the clouds his chariot: Who walketh upon the wings of the wind: Who maketh his angels spirits; his ministers a flaming fire: Who laid the foundations of the earth, that it should not be removed for ever. Thou coveredst it with the deep as with a garment: the waters stood above the mountains." ⁴

During the period of shade the light from below illuminated the vapor arc or crescent (moon of the ancients) with a pale refulgence, weird, cold, and uncanny. The witness of the shadow of the earth on the canopy is the Pyramid of Cheops (Isa. xix: 19-20; Jer. xxxii: 17-20). The time of shade or shadow, associated with death by the Egyptians, was the night-time. A shadow-cone, or pyramid, was projected into the canopy from the sunlight shining up from the under-world.

A sparkling canopy diffused its light on an awakening earth. After man was created (evolved), this was to him the "shiner," or his sun. In Joshua's day this sun stood still. "The sun and moon stood still in their habitation: at the light of Thine arrows they went, and at the shining of Thy glittering spear." ⁵

At night-time the canopy was the lesser light or moon. "Fontenelle, who was always so ingenious in determining the conditions of existence in the planetary worlds, expresses himself thus in regard to Saturn: 'We would be much astonished to see over our heads at night that great ring, which would extend as a half-circle from one end of the horizon to the other, and which, reflecting the light to us, would

⁴Ps. civ: 1-6. ⁵Hab. iii: 11.

produce the effect of a continuous moon.'”⁶ Rawlinson tells us in his *History of Ancient Egypt* that “under Necherôphes (Nebka?) the Libyans, who had revolted, made their submission on account of a sudden increase in the moon’s size, which terrified them.”⁷ This increase in size stamps the phenomenon as belonging to an infalling canopy.

It has been shown that the great precipitation accompanying the disintegration of these belts was in the higher latitudes, beyond the region of the greenhouse-roof. Job tells us that here were stored the treasures of snow and hail (Chap. xxxviii: 19–23). Under the canopy evaporation went on at a great rate. No doubt, however, the atmosphere was of a moist and misty character, hence the dews were intensely copious. The Scriptures say, the dew or mist rose from the ground (Gen. ii: 5–6). Who would have had the hardihood to make such a statement, so utterly in conflict with the established laws of nature, were the hand of revelation not in this record?

Science and the Bible do not disagree. One is God’s created record and the other is God’s written record. The works of His hand cannot contradict the works of His heart; in Him is no variableness, neither shadow of turning. Of old He laid the foundations of the earth: and the heavens are the works of His hands (Ps. cii: 25). The works of His heart are love, and the object of His love is to draw all men unto Himself. He so loved the world that He gave us the written word (John i: 1–14; iii: 16).

Science and the Bible do not disagree, but the interpretations which man has evolved need to be either adjusted or rejected. When a proper understanding is arrived at, harmony is at once evident and the two testimonies become essentially one. Now, the Bible is full of the same kind

⁶ *Scientific American Supplement*, No. 192.

⁷ Vol. ii, chap. xii, p. 18.

of tales as the ancients have left us in their varied literature, commonly called myths, but it is offensive to a certain type of mind to say that the Bible contains these myths. The reason for this is that a lack of knowledge of the mental horizon of the ancients exists. The common understanding of a myth is that it is purely a fabulous or imaginary tale, and the fact is lost sight of that it generally conveys an important truth of an allegorical and religious nature. In the light of this present hypothesis the nature myths of these so-called heathen were essentially religious, and they were not so far from the true religion either, inasmuch as the nature-types were pointing the way to God. Before taking exceptions to the existence of these myths in the Bible, then, their meaning should first be ascertained.

The trouble is this: The truths taught by the so-called myths have been forgotten, the Bible is a book of the past as well as a book of to-day, and therefore to understand it we must understand the past. Our Saviour spoke a parable of a sower that went forth to sow, that he might impress thereby a spiritual teaching. Now, the solar myth of Samson, which we will investigate later, it is evident was introduced into the Old Testament not by spontaneous growth nor by popular origin, but as in the case of the parable by divine direction, and for the same purpose, namely, to set forth a spiritual truth. All the saints living in those days were as familiar with the illustration as we are to-day with the settings of our Saviour's parable.

In the beginning, as in our Saviour's day, the hand of God was visible. He planned it all before He began its fulfilment. His love brooded over this earth, giving to man an Eden paradise. Man, tempted by the beauty of this creation, fell into the serpent's clutch, worshipping the creation or creature instead of the Great Creator. God in His infinite love then revealed Himself, casting man out from the garden world wherein he had dwelt, that he might learn

the lesson, that first things must perish and that in the second state alone there is life. In other words, matter always has been and always must be subject to change. The spiritual essence alone is unchangeable. This explains many of the mooted questions of the theologians—the cause of the fall; the mystery of iniquity; God's love reconciled with the admission of sin into the world, etc., etc.

Briefly, the drama of sin, and of death, and of resurrection, was all revealed in the type, and the type was the physical canopy and the vapor-belt which hung under the canopy in the atmosphere. Natural phenomena were used by God to convey the spiritual truth. The ordinary myth missed this revelation, the Biblical always emphasized it. The Adamite saw the works of creation, that they were good, and forthwith worshiped the creature (serpent), leaving out the Creator. This was the act of partaking of the tree of knowledge.⁸ Man as a free agent thus brought on his own fall, for God in His infinite goodness and justice of necessity had to disclose the nature of creation. This left man with the knowledge of good and evil, with knowledge of the Creator and the creature, and it also left him the heritage of original sin, for the fallen serpent or vapor skies allowed the actinic rays to enter, and these produced fermentation, violence, and a quickened life. The first drunkenness mentioned in the Bible is that of Noah's. It is postulated that a remnant of the Edenic canopy caused the deluge of the Scriptures. In the world that was before this flood, Noah never knew the fruit of the vine to produce such results, but with the passing of the canopy new conditions of sun-fire were introduced, to which he was not accustomed. His sin was, therefore, the result of ignorance; immediately afterwards he preached a sermon. In this age we do not listen to men recovering from

⁸ The tree in mythology will be shown in subsequent chapters to be the canopy.

a spree, but Noah's voice has sounded on down through the ages. The longevity of the ancients was a direct result of the more healthful conditions, though undoubtedly the canopy prevented their keeping track of the years. Hence the great age of Methuselah and the rest of the antediluvians was due to the two causes. When sun-fire broke in, the quickened life brought a swifter death.

In this connection it is interesting to note that at a certain early period the "Egyptians neither employed nor knew any years of longer term than four months. The proof of this, admits one of the most ardent champions of the high antiquity of Egypt, is that, later, when the year consisted of twelve months, three seasons were designated, each comprising four months, which were indicated hieroglyphically by the word *ter*, and by a sign that may mean a season or a year, indifferently."⁹

But to return to the heritage of sin: With the removal of the Edenic canopy evil conditions came upon the earth. "Cursed is the ground," says the Lord God, "for thy sake; in sorrow shalt thou eat of it all the days of thy life."¹⁰ The protecting canopy which was cast down was the serpent. "And the Lord God said unto the serpent, Because thou hast done this, thou art cursed above all cattle (behemah), and above every beast of the field; upon thy belly shalt thou go, and dust shalt thou eat all the days of thy life."¹¹

The Bible myths, then, portray the story of the conflict, and present both the good and evil sides thereof. In the *Walam Olum*, or Red Score of the Lenapé, "The cosmogony describes the formation of the world by the Great Manito, and its subsequent despoliation by the spirit of the waters, under the form of a serpent. The happy days are depicted

⁹ F. De Lanoye, "Wonders of Art and Archæology: Rameses the Great," p. 31. Dr. H. De Brugsch, "History of Egypt from the Earliest Period of its Existence," Leipzig, 1859, p. 26.

¹⁰ Gen. iii:17. ¹¹ Gen. iii:14.

when men lived without wars or sickness, and food was at all times abundant. Evil beings of mysterious power introduced cold and war and sickness and premature death. Then began strife and long wanderings." ¹²

Primitive man began to go astray in his religion by taking the natural phenomena of the canopy and attributing to them life; then he deified the creations of his mind. He passed from the worship of God to the worship of the works and forces which God had made, from reverence for the creator to reverence for the created. Thus canopy worship became simply a form of animism. It follows that a just God had to remove the cause of this error. He had to dethrone the gods of the heathen.

The first step in dethronement was the revealing of the true sun through the equatorial slit or opening between the northern and southern halves of the divided canopy. In Genesis this event, which follows immediately after the fall of man into the error of serpent worship, is described as the introduction of "a flaming sword which turned every way, to keep the way of the tree of life." ¹³ To keep the way open for man to see the Creator through whom there is life. The tree, the eating of which caused them to know good and evil, perished.

The two halves of the canopy, as we have already seen, were the pillars of Hercules. Job speaks of them as the "pillars of heaven," and the opening as the "chambers of the south." The mountains of the cloud-belt were removed. ¹⁴ Verily these mountains have a new significance. Mount Olympus, the home of the gods. Ossa heaped on Pelion. Jacob's ladder, etc.

Under the name of Hercules the Romans, Greeks, and Phœnicians worshiped the sun. The story of Samson is the

¹² D. G. Brinton, "The Lenapé and Their Legends," p. 164.

¹³ Gen. iii: 24. ¹⁴ Job ix: 5-9; xxvi: 11.

Biblical account of the same sky hero. The Hebrew form of his name is, Shimshon, which is a variant form of Shamash—the name of the sun in Babylonian and Hebrew.¹⁵

Like Hercules, Samson performed twelve labors in order to free himself. First, he rent the lion as Hercules did the Nemean sky monster, the skin of which he then used as a cloak. The meaning of this is that the conquering sun was obscured or hidden by the enveloping cloud. Second, he extracted honey. Third, he slew thirty men. Fourth, he caught some foxes. Fifth, with hip and thigh he made a slaughter. Sixth, he broke certain cords. Seventh, he slew a thousand men. Eighth, he carried off the gates, posts, bar and all. Ninth, he broke green withes. Tenth, he broke the new ropes. Eleventh, he carried off the pin and beam of the sky temple (Latin, *templum*, expanse, open place), the original sky home of the gods. Twelfth, he pulled down this temple on his own head.¹⁶

But though related to the Greek, Roman, and Phœnician, this solar myth also bears a close analogy to the Babylonian. Jastrow says: "The Biblical Samson appears to be modelled upon the character of Gilgamesh. Both are heroes, both conquerors, both strangle a lion, and both are wooed by a woman, the one by Delilah, the other by Ishtar, and both through a woman are shorn of their strength. The historical traits are of course different."¹⁷

The Bible tells us of these things because they are part of the error of the ages, and the Bible presents both sides, and it is written for all *Eternity*, and God's purposes must be true, though every man be a liar.¹⁸ "Nay, but, O man, who art thou that repliest against God? Shall the thing

¹⁵ Morris Jastrow, "The Religions of Babylonia and Assyria," chap. xxiii, p. 515.

¹⁶ Judges xiv-xvi.

¹⁷ "Religions of Babylonia and Assyria," pp. 515-516.

¹⁸ Rom. iii: 3-4.

formed say to Him that formed it, Why hast Thou made me thus?" ¹⁹ "He that sitteth in the heavens shall laugh: the Lord shall have them in derision." ²⁰

Nay, but, O man, surely it may be said of you that ye have questioned the very record of the flood itself (II Pet. iii: 5-6), and, what makes it worse, this is not a myth which you have put the interrogation mark against, but a matter of scientific and Biblical fact.

The Noachian flood probably extended over a vast territory in Central Asia and perhaps portions of Europe. Many similar catastrophes of a like character occurred at about the same time. The submergence was connected with the Glacial period. The Ice-king held in his grip four million square miles of the American continent and two million square miles of western Europe. These immense areas were buried under a mile or more of glacial ice. The shifting of this vast weight brought about, as we have seen in our scientific chapters, a number of secondary results, amongst which may be included the great inundations recorded by prehistoric man.

"The principal countries in which these Flood-stories are found are Greece (Deucalion's deluge), Lithuania, Australia, Hawaii and other Polynesian islands, Cashmir, Thibet, Kamchatka, different parts of India, and America (where such stories are particularly numerous); they are not found (according to Andrée) in northern and central Asia; they are also absent in Egypt, China, and Japan, and almost absent in other parts of Africa (except where they are due to Christian influence).²¹

"It was maintained by the late Professor Prestwich, on the ground of certain geological indications (especially the so-called 'Rubble Drift'), that long after the appearance

¹⁹ Rom. ix:20. ²⁰ Ps. ii:4.

²¹ Westminster Commentaries, Gen. The Deluge, pp. 101-102.

of paleolithic man, there was a submergence of the crust of the earth, chiefly in W. Europe, but also in N. W. Africa, though extending doubtfully as far E. as Palestine, causing a great inundation of the sea, which, though of short duration, destroyed a vast amount of animal and some human life, so that some species of animals (*e.g.*, the hippopotamus in Sicily) became extinct in regions which they formerly inhabited; and he suggests that this inundation may have accounted for the above-mentioned traditions.”²²

The Commentator thinks that it mitigates against the truth of Prestwich's theory that in Europe itself Flood stories are comparatively scarce and that they are more frequent in countries such as North and Central America. On the other hand, where flood, and fire (volcanic), and earthquake, turned the earth into a cemetery, where was there a man left to preserve the record? Dead men tell no tales.

It is not necessary to suppose that Europe was inundated at the time of the Noachian submergence. The cataclysm simply overwhelmed the known earth of the Adamite (Caucasian) race. The whole area of northern Asia is still said to be slowly rising, which may be taken as an indication that the figure of the continent has not yet regained its normal condition. Scattered lakes over this part of Asia are inhabited by the same animals. How did they get from one to the other? Intervening stretches of desert contain semi-fossil shells of the species still living in the lakes.²³

Of Central Asia and southern Siberia G. Frederick Wright says: “The geological conditions are such as can only be explained by an extensive submergence of the region where the Scriptures and tradition locate the Flood which destroyed the whole human race, excepting Noah and his family. The evidences of such a deluge are not one, but

²² *Ibid.*, p. 102. ²³ *American Geologist*, vol. v, No. 3, p. 182.

several, and extend from Mongolia to the western borders of Russia." ²⁴

With the close of the Glacial period it is not to be supposed that all remnants of the canopy and vapor-belt at once disappeared. The Babel Builders (Gen. xi:4-9) sought to reach this canopy or heaven. Its ever-changing appearance caused great confusion of tongues and of thought as the various peoples described different scenes to each other, and converted the natural phenomena into heroes and demi-gods; and, furthermore, they worshiped these ever-changing appearances as gods and devils, adding confusion to the already existing chaotic discord and disorder.

Berosus records the Chaldean version of this event in complete agreement with the Biblical account, as follows: "They say that the first inhabitants of the earth, glorying in their own strength and size and despising the gods, undertook to raise a tower whose top should reach the sky, in the place in which Babylon now stands; but when it approached the heaven the wind assisted the gods and overthrew the work upon its contrivers, and its ruins are said to be still at Babylon; and the gods introduced a diversity of tongues among men, who till that time had all spoken the same language; and a war arose between Cronus and Titan. The place in which they built the tower is now called Babylon, on account of the confusion of tongues, for confusion is by the Hebrews called Babel."

It will be seen from this that the gods were afraid that man would reach their abode. Elsewhere this version clearly states that they were building "in order that they might mount up into heaven." ²⁵

Of the confusion of tongues we have this to say: The

²⁴ *McClure's*, June, 1901, vol. xvii, No. 2, p. 134.

²⁵ Rawlinson, "Seven Great Monarchies," vol. i, Chaldea, Assyria. Note 141 to chap. vii of "First Monarchy," p. 526.

changing aspects of the sky caused the words which the peoples used in describing what they saw to change with the same rapidity as the scenes themselves. While all this was but a phase of inanimate nature, yet it seemed ever to be producing new forms, hence in describing it the ancients confused its various phenomena with the idea of sex. Gender-terminations are a part of the bacillus which was thus injected into the tongues of the nations.²⁶ But though this gave rise to a great many different languages, the fact remains that there were old root languages from which these new languages were descended, and they of course did not originate in this way. Andrew Lang says:

"After taking my degree in 1868, I had leisure to read a good deal of mythology in the legends of all races, and found my distrust of Mr. Max Müller's reasoning increase upon me. The main cause was that whereas Mr. Max Müller explained Greek myths by etymologies of words in the Aryan languages, chiefly Greek, Latin, Slavonic, and Sanskrit, I kept finding myths very closely resembling those of Greece among Red Indians, Kaffirs, Eskimo, Samoyeds, Kamilaroi, Maoris, and Cahrocs. Now, if Aryan myths arose from a 'disease' of Aryan languages, it certainly did seem an odd thing that myths so similar to these abounded where non-Aryan languages alone prevailed. Did a kind of linguistic measles affect all tongues alike, from Sanskrit to Choctaw, and everywhere produce the same ugly scars in religion and myth?"²⁷ In reply to Lang's query we would say that it

²⁶ "In ancient languages* every one of these words (sky, earth, sea, rain) had necessarily a termination expressive of gender, and this naturally produced in the mind the corresponding idea of sex, so that these names received not only an individual but a sexual character." Max Müller, *Chips*, iv, 62. We explain this matter by the theory that man called the lifeless things and phenomena of the canopy male or female—by using gender-terminations—as a result of his habit of regarding the lifeless things, etc., as personal beings and as gods.

²⁷ "Modern Mythology," p. 4.

is quite evident that the germ which scattered the linguistic measles in all the root languages was the ever-changing sky phenomena. Max Müller should not have confined this infectious disease to the Aryan language alone.

But we have had enough about languages, so let us return to the sky scenes themselves. At a time when the Pillars of Hercules spanned the equatorial heavens there was an open spot or egg hole in the distant northern sky. The Bible calls this spot "Baal-peor": Baal, "the lord," Peor, "the opening." Israel fell into the worship of this dreadful nature cult and was accordingly punished (Num. xxv: 3-5).

Nature or creature worship always dies hard. In Ezekiel's time this evil thing had not yet been extirpated (Ezek. viii: 7-10). In the winter the sun, being in southern latitudes, was of course far away from this hole which was the only place in the heavens where he could be seen, hence Tammuz was lost. In the prophet's vision every man saw this "in the chambers of his imagery" (v. 12). In other words, like Ptolemy's rings, this cult was only an echo. Bel worship was indeed a terrible thing. Confusion's place was at this sky-hole or 'gate of God.' It is recorded that the prophet came to "the door of the gate of the Lord's house which was toward the north; and, behold, there sat women weeping for Tammuz" (v. 14). Tammuz means "the hidden lost one." Tammuz, it will plainly be seen, was originally the hidden sun, and even at this time it was known that this weeping was for the sun. Sun worship was then in full possession of the Lord's house itself (v. 16).

It is recorded of Tammuz that he was seen bleeding. This is easily accounted for, as the great sky-hole must have often been decked out in ruddy or sunset hues. This door or opening into the heavens proved like the serpent a snare. It is more than likely that our Saviour referred to it when he said, "I am the door," "the way," "the truth," "the life." The door of the shining hole produced a stupendous error, but

now we know that first (natural) things must perish that the last (spiritual) may live.

The Indians of northern California have a legend which localizes this sky-hole over Mount Shasta. They say that the Creator made it first. The account is as follows: "Boring a hole in the sky, using a large stone as an auger, he pushed down snow and ice until they reached the desired height; then he stepped from cloud to cloud down to the great icy pile, and from it to the earth, where he planted the first trees by merely putting his finger into the soil here and there. The sun began to melt the snow; the snow produced water; the water ran down the sides of the mountains, refreshed the trees, and made rivers. The Creator gathered the leaves that fell from the trees, blew upon them, and they became birds, etc." ²⁸

The story of Odysseus in the cave of Calypso (Greek *Kalupto*, to cover) is but one of the many myths which have arisen from this same scene. In Calypso's grotto-cave, located in the Isle of Ogygia, in the hub of the sky sea, were stars or nails that were fixed in the wondrous azure blue. This was the egg-land, or beginning place where man first learned astronomy. Man in those early days not only knew God through the gospel of the stars, but also through the beauties of the canopy, which were to them who were of a true heart a guide and type to things celestial.

One of the most glorious types was that of the cherubim. When the flaming sword, the bright shaft of sunlight, first pierced the Edenic canopy, the sun itself floated as in a vapor arc or shell accompanied by four mock suns surrounded with halos. These were the cherubim, types of the redeemed in future glory, true consorts of the living Son of God. The first like a lion, the Nemean beast which Hercules the sun was sent to slay. The second, "like a calf," the solar bull

²⁸ Bancroft, "Native Races," vol. iii, p. 90.

famed in the mythology of the ancients. The third had a face as a man, made in the image of the solar orb. The fourth, a flying eagle—the winged disk being Assyria's old emblem of the sun.

In Genesis iii, the cherubim appear as guardians of God's abode and of the spiritual treasures reserved therein. The passage which should on all grounds be compared is Ezek. xxviii: 13–17. Ezekiel states that he was by the river of Chebar (chap. i: 3) when he received this word. This river was a large, navigable canal, not far from Nippur, southeast of Babylon.²⁹ But we are not concerned with the site; it is not where the prophet had the vision that interests us, but it is the substance, the mythological fact. It does not follow that he actually saw the wheels; what the text tells us is that he saw a vision. In his mind's eye he saw what even then probably was a remote occurrence.

“In Ezekiel xxviii: 13–17 there is a description where the ‘prince of Tyre’ is represented as a glorious being bedecked with gold and precious stones, who had been placed ‘in Eden, the garden of God,’ had there ‘walked up and down in the midst of stones of fire’ (*i.e.*, flashing gems), but had forfeited his high estate by pride, and had been expelled from the holy ‘mountain of God’ by a cherub. Ezekiel, it is probable, had access to traditions about Paradise more ample than those preserved in Genesis, and perhaps in some respects different from them; and he makes use of them here for the purpose of representing pictorially the fall of the King of Tyre.”³⁰

“And He rode upon a cherub, and did fly; yea, He did fly upon the wings of the wind.” The same authority says of the passage just cited: “Ps. xviii: 10 would suggest that the conception arose in a personification of the thunder-cloud

²⁹ University of Pennsylvania texts, vol. ix, p. 28.

³⁰ Westminster Commentaries, Gen. The Cherubim, p. 61.

(upon, or within, which, as the context of the verse plainly shews, the Hebrews believed Jehovah to be borne along).”³¹

From the ‘ prince of Tyre ’ to Satan, or ‘ the prince of the power of the air,’ is only a step. Satan in Arabic means a serpent. The apostle was sent, To open certain eyes, and to turn them from darkness to light, and from the power of Satan or the serpent unto God (Acts xxvi:18). In other words, His commission was to turn men from the material to the spiritual, from the darkness, the seed of which was planted by the canopy, to the light. And this light we find is bearing fruit abundantly in the scientific revelations of this present age. The prince of the power of the air (Eph. ii:2) is the prince of this world, and he is cast out (John xii:31).

The serpent was a vapor-belt. Moses lifted up a figure still known to all the people in that day as a memorial of a creation that had passed away, and they were to look by faith for a new order in a coming Saviour. The barber’s pole is still a survival of serpent symbolism amongst us. The ribbon painted spirally around their sign represented originally the serpent. Formerly the barbers were doctors, thus naturally they adopted the sign and symbol of the healer.

The old creation that had passed was an Eden, but because the people worshiped the creature instead of the Great Creator, the God of Nature was forced to reveal Himself and to cast down the serpent upon the ground. The Eden conditions passed, and man has had to earn his livelihood by the sweat of his brow ever since. Jer. x:11-12; Isa. xix:1; Rev. xii:9, 15. This last quotation shows how the error of the ages has lived on down to our time. Ps. xix:1; Job xxvi:8-13; Gen. iii:1, 14; Isa. xxvii:1; Ps. lxxiv:13-15.

The following passages of Scripture introduce many

³¹ *Ibid.*

features not presented in the text for lack of space. The summary only suggests some of the riches which may be unearthed.

Introduction. Heb. xi:3, 7; Isa. xl:21-22; II Pet. iii:3-6.

Creation. Gen. i:6-7.

The Beginning. Ps. xix:1; Amos ix:6; Ps. xxxiii:6-7; xxiv:1-2.

Dew ascending from the ground. Gen. ii:5-6.

Heavens stretched out. Job xxxvii:18; Isa. xlii:5; xliiv:24; xlv:12; li:13.

Water Heavens (Secondary vapor-belts held in suspension under the canopy). Job xxxviii:1, 4-11, 16-17, 37; Ps. civ:2-6.

Water heavens worshipped. Punishment followed. Jer. x:11-12; Isa. xix:1; Rev. xii:9, 15.

Serpent, *i.e.*, serpent-like belt. Job xxvi:8-13; Gen. iii:1, 14; Isa. xxvii:1, Ps. lxxiv:13-15; Rev. xii. Note specially v. 15. Moses lifted up a sign familiar to the multitude. Num. xxi:9; John iii:14-15.

Treasures of snow. Job xxxviii:22-23; Rev. xi:19; xvi:21.

Falling vapor-belts. Job ix:5-8. In v. 8 *bamah* is the word translated waves, it means in Hebrew "heights." Hag. ii:6, 21; Joel ii:2-11; Isa. ii:19-21; Heb. xii:26-27; Hab. iii:6-15.

The Flood. Gen. vii. Note specially v. 11.

Rainbow after canopy fell. This phenomenon could not take place until the vapor-heavens cleared. Gen. ix:8-17.

Babel. Gen. xi:4-9.

Pillar of cloud. Ex. xiii:21-22; xiv:19-24.

Ancient sun or shiner stood still. Joshua. x:12; Hab. iii:11.

Flaming Sword. Gen. iii:24.

Cherubim. Gen. iii:24. Connecting link with canopy. Ps. xviii:7-16; civ:3-4; Ezek. x.

Good canopy turned evil. Ezek. xxviii:14-17.

Wheels. Ezek. i.

Horses. Zech. i:8; Rev. vi:2-8; Hab. iii:6-15.

Voice of Many Waters. Ezek. xliii:2; Dan. x:6; Rev. i:15; xiv:2; xix:6.

Pyramid. The witness of the shadow of the earth on the canopy. Isa. xix:19-20; Jer. xxxii:17-20.

CHAPTER XIV

HINDU MYTHS

"THE gods themselves cannot recall their gifts." ¹ Vedic literature contains the record of five elements, fire, water, earth, air, and nature, the latter containing Agni, the 'Golden Germ,' which is evidently the creative power seen in the fire ring or belt. Edward Washburn Hopkins says: "The world was at first water; thereon floated a cosmic golden egg (the principle of fire). Out of this came Spirit that desired; and by desire he begat the worlds and all things. It is improbable that in this somewhat Orphic mystery there lies any pre-Vedic myth. The notion comes up first in the golden germ and egg-born bird (sun) of the Rik. It is not specially Aryan, and is found even among the American Indians." ²

From the canopy continually came new sky-scenes which the ancients thought were manifestations of their gods, hence according to their records "Agni is Varuna and is Indra." Plainly Agni, the reflected light of the sun, was seen in Varuna and in Indra. All fire was seen emerging from the upper dome of gauze. Hopkins describes the attributes of Indra as follows:

"Indra has been identified with 'storm,' with the 'sky,' with the 'year'; also with 'sun' and with 'fire' in general. But if he be taken as he is found in the hymns, it will be noticed at once that he is too stormy to be the sun; too luminous to be the storm; too near to the phenomena of the monsoon to be the year or the sky; too rainy to be fire; too alien from every one thing to be any one thing. He is too celestial to be wholly atmospheric; too atmospheric to be celestial; too earthly to be either. A most tempting solution

¹ Tennyson. ² "The Religions of India," chap. ix, p. 208.

is that offered by Bergaigne, who sees in Indra sun or lightning. Yet does this explanation not explain all, and it is more satisfactory than others only because it is broader; while it is not yet broad enough. Indra, in Bergaigne's opinion, stands, however, nearer to fire than to sun."³

Indra was the clear sky or sun. Dyaus also was the true sky. His name is derived from Dyū "to shine." Zeus comes from the same root.

O Agni, give us eyes that we may see
 The mighty Indra, in his shining car,
 Ride o'er the canopy, the great enfolder!
 His golden whip, the ray of penciled light,
 In his strong arms. His ruddy cheeks aglow—
 The clear-sky of the heavens towards the poles
 All reddened by prismatic rays of light.
 The golden helmet of the crownèd sun,
 Like a lamp flaming in a heavy mist—
 All nature proving that the gods are one.
 O Agni! Thou art terrible.—We fear!—
 "Yea, when the waters covered everywhere
 "They held the germ, they generated light—
 "Then came from the one spirit, breath of gods.
 "May he not hurt us, he the Lord of beings."
 May he not hurt us.—Agni, hurt us not!⁴

Indra the clear sky conquered all the Asura, including Varuna Asura, the dragon serpent, whose eyes were magnified additions or haloes of the sun. She grew up over and covered all the other Asuras, as a canopy drifting towards the poles always did.

Zénaïde A. Ragozin says: "Now, Sanskrit has a root *vri*, 'to cover'—a prolific one, which can be traced in many words of kindred meanings—and one of its most direct formations is this very name of Varuna. It is as though we called the sky 'the coverer, the enfolder.' * * * All ancient peoples used to say that 'the heavens cover or

³ *Ibid.*, ch. iv, pp. 91-92.

⁴ Adapted to the present interpretation. After a famous hymn, etc., from the Rig Veda.

encompass the earth and all it contains,' sometimes adding 'like a tent' or 'like a roof'—and meant it literally, not metaphorically."⁵

"I will sing forth unto the universal king a high, deep prayer, dear to renowned Varuna, who, as a butcher a hide, has struck earth apart (from the sky) for the sun. Varuna has extended air in trees, strength in horses, milk in cows, and has laid wisdom in hearts; fire in water; the sun in the sky; *soma* in the stone. Varuna has inverted his water-barrel and let the two worlds with the space between flow with. With this (heavenly water-barrel) he, the king of every created thing, wets the whole world, as a rain does a meadow. He wets the world, both earth and heaven, when he, Varuna, chooses to milk out (water)."⁶

Varuna is the universal encompasser, the canopy. He stands in mid-air like Parjanya and upsets a water-barrel. Agni is the light or fire in the water-sky; afterwards he is earthly fire. To place on the altar that which was seen in the sky was a natural sequence. Fire worship is the logical result of seeing fire in heaven. Indra is the true sun seen floating above Varuna in a boat or vapor-arc. In the Egyptian myth, Nu-t is depicted as a water-sky with stars above her. The hymns and prayers to these Vedic gods are naturally much confused, for the reason that the ever-changing features of the zonal cloud system resulted in the votaries of one age emphasizing a feature known as a god which the peoples of a following generation perhaps could not distinguish. Thus Indra might be obscured by Varuna Asura growing up over and covering him from view.

"He, men, is Indra," as the Vedas say, and Agni is Varuna and is Indra. This confusion was caused by the ever-changing appearance of the sky-scene. It reminds us of the confusion of tongues at Babel. He slew the snake

⁵ "The Story of Vedic India," ch. v, ¶ 8, pp. 140, 141.

⁶ "Religions of India," pp. 65-66. Rig Veda v, 85.

that lay upon the hills. He Vritra slew. Watched by the snake, the waters stood on high. What time the water-covered cave he opened, the waters freed.—Like bellowing kine they swiftly flowed to earth.⁷

The text says: "He men is Indra of the long red beard." There are several features about Indra that reminds us of Thor, the Scandinavian thunder god, Jove the thunderer, and of Samson. Both Indra and Thor had lightning or fire beards. Samson's hair also figured as a cause of his strength. He set fire to the corn of the Philistines (Judges xv: 4-5). In Indra's fight with Vritra, the former's thunderbolt is all-powerful.⁸

"He men is Indra of the long red beard" is plainly the same as Hercules. The Acvins were the two pillars of light seen in the canopy at night. The canopy—that is, the north and south belts—caught the rays of the sun from the underworld, making two pillars. These were the Pillars of Hercules. They were the 'Horsemen,' twin sons of Dyaus. Their steeds, the whirling belts, were ever in motion.

The Maruts, whose name means the shining, gleaming ones, always accompanied the storm bringer, Indra. Their mother was the variegated cow, Pricni, the mother cloud.⁹ These warlike Maruts thus spoke to Indra bragging what they had done:

"Thou hast indeed done great things, O mighty one, with us for thy helpers, through our equal valor. But we Maruts, O strong Indra, can perform many great deeds by our power when we so desire."

Indra retorts: "By my own inborn might, O Maruts, I slew Vritra. Through my own wrath I grew so strong. It was I who, wielding the lightning, opened the way for the shining waters to run down for men."¹⁰

⁷ Rig Veda i, 32.2 and v. 11.

⁸ Hopkins, "The Religions of India," chap. xiv, p. 357.

⁹ *Ibid.*, p. 97. ¹⁰ Rig Veda i, 165. Ragozin, "Vedic India," p. 211.

The Maruts knuckled and admitted that Indra had "no equal among the gods." Yet they too were immortal. The whole story is that of Hercules and the many-headed Hydra. One of these heads proved immortal, which signifies that the storm winds cannot be subjugated by the sun; those heads which Hercules killed being the violent personifications of the Ice age.

The Maoris of New Zealand have a story entitled 'The Legend of the Children of Heaven and Earth.' It was taken down by Sir George Grey many years ago, and though it is somewhat lengthy, it will bear perusal in this connection. We would have the reader note especially the character of Tawhiri-ma-tea (the immortal storm-head).

"Men had but one pair of primitive ancestors; they sprang from the vast heaven that exists above us, and from the earth which lies beneath us. According to the traditions of our race, Rangi and Papa, or Heaven and Earth, were the source from which, in the beginning, all things originated. Darkness then rested upon the heaven and upon the earth, and they still both clave together, for they had not yet been rent apart; and the children they had begotten were ever thinking amongst themselves what might be the difference between darkness and light; they knew that beings had multiplied and increased, and yet light had never broken upon them, but it ever continued dark. Hence those sayings are found in our ancient religious services: 'There was darkness from the first division of time unto the tenth, to the hundredth, to the thousandth,'—that is, for a vast space of time; and these divisions of time were considered as beings, and were each termed a Po.

"At last the beings who had been begotten by Heaven and the Earth, worn out by the continued darkness, consulted amongst themselves, saying, Let us now determine what we should do with Rangi and Papa, whether it would be better to slay them, or to rend them apart. Then spoke Tu-ma-

tauenga, the fiercest of the children of Heaven and Earth, 'It is well, let us slay them.'

"Then spake Tane-mahuta, the father of forests and of all things that inhabit them or that are constructed from trees, 'Nay, not so. It is better to rend them apart, and to let the heaven stand far above us, and the earth lie under our feet. Let the sky become as a stranger to us, but the earth remain close to us as our nourishing mother.' The brothers all consented to this proposal, with the exception of Tawhiri-ma-tea, the father of winds and storms, and he, fearing that his kingdom was about to be overthrown, grieved greatly at the thought of his parents' being torn apart. Five of the brothers willingly consented to the separation of their parents, but one of them would not agree to it.

"The brothers all tried, in vain. The god and father of the cultivated food of man, god and father of fish and reptiles, etc.—every one failed. Then at last slowly uprises Tane-mahuta, the god and father of forests, of birds, and of insects, and he struggles with his parents; in vain he strives to rend them apart with his hands and arms. Lo, he pauses, his head is now firmly planted on his mother, the earth, his feet he raises up and rests against his father, the skies; he strains his back and limbs with mighty effort. Now are rent apart Rangi and Papa, and with cries and groans of woe they shriek aloud. 'Wherefore slay you thus your parents? Why commit you so dreadful a crime as to slay us, as to rend your parents apart?' But Tane-mahuta pauses not, he regards not their shrieks and cries; far beneath him he presses down the earth, far, far above him he thrusts up the sky.

"Hence these sayings of olden time: 'It was the fierce thrusting of Tane which tore the heaven from the earth so that they were rent apart, and darkness was made manifest, and so was light.'

"No sooner was heaven rent from the earth than the mul-

titude of human beings were discovered whom they had begotten, and who had hitherto lain concealed between the bodies of Rangi and Papa.

“The legend next describes how Tawhiri-ma-tea, god and father of winds and storms, arose and followed his father to the realms above, hurrying to the sheltered hollows of the boundless skies, to hide and cling and nestle there. Fierce desire came to him to wage war against his brethren who had done such unhandsome deed to their parents. ‘Then came forth his progeny, the mighty winds, the fierce squalls, the clouds, dense, dark, fiery, wildly bursting; and in their midst their father rushed upon his foe.’ Tane-mahuta and his giant forests were taken unawares, unsuspecting, when the raging hurricane burst upon them, the mighty trees were snapped in twain, prostrated, trunks and branches left torn upon the ground for insect and grub to prey on. The sea was swept and tossed with wild surgings and mountain waves till Tangaroa, god of the ocean and father of all that dwell therein, became affrighted and fled. His children, the parents of fish on the one hand and of reptiles on the other, fled, the one into the depths of the sea, the other into the recesses of the shore, amid the forests and the scrubs.

“The storm-god attacked his brothers, the gods and progenitors of the tilled food and the wild, but Papa, the Earth, caught them up and hid them, and he searched and swept to find them, in vain. He fell upon the last of his brothers, the father of fierce men, but him he could not even move. Man stood erect, unshaken upon the bosom of his mother earth. ‘At last the hearts of the Heaven and the Storm became tranquil, and their passion was assuaged.’

“But now Tu-ma-tauenga, father of fierce men, became stirred to attack. He was minded to avenge himself upon his brethren who had left him unaided to stand against the god of storms. He twisted nooses of the leaves of the whanake tree, and the birds and beasts, children of the forest-god,

fell before him; netted nets of the flax plant and dragged ashore the fish; he digged in the ground and brought up the sweet potato and all cultivated food, the fern root and all wild growing food. He overcame every one of the brothers, all but the storm-god, who still ever attacks him in tempest and hurricane, seeking to destroy him both by sea and by land. It was in one of these attacks that the dry land was made to disappear beneath the waters.

"The beings of ancient days who thus submerged the land were Terrible-rain, Long-continued-rain, Fierce-hail-storms; and their progeny were Mist, Heavy-dew, and Light-dew, and thus but little of the dry land was left standing above the sea.

"From that time clear light increased upon the earth, and all the beings which were hidden between Rangi and Papa before they were separated now multiplied upon the earth. The first beings begotten by Rangi and Papa were not like human beings; but Tu-ma-tauenga bore the likeness of a man, as did all his brothers.

"Up to this time the vast Heaven has still ever remained separate from his spouse, the Earth. Yet their mutual love still continues,—the soft warm sighs of her loving bosom still ever rise up to him, ascending from the woody mountains and valleys, and men call these mists; and the vast Heaven, as he mourns through the long nights his separation from his beloved, drops frequent tears upon her bosom, and men, seeing these, term them dew-drops."¹¹

This long citation shows the similarity of the many-headed storm-king myth throughout the world. The lifting of the canopy was invariably followed by a season of tempestuous violence. But let us return to the Hindu legends.

The Rig Veda, which is the oldest Hindu authority, is a compiled work, containing many additions of a later day;

¹¹ Grey's Polynesian Mythology, pp. 1-5, 14, 15, as quoted by Charles De B. Mills, "The Tree of Mythology," pp. 269-274.

thus hymns that first expressed the scenes of a water sky were afterwards in part rearranged to adapt them to the changed conditions. But this will become clearer to us as we peruse the following selections taken from the Second Series of Auld Lang Syne. It will be noted that these mostly record the scenes of the vapor-belt and canopy period.

HYMN TO SAVITRI SUN. (RIG-VEDA i, 35, 2.)

- (6) Three skies are there of Savitri, two places,
And one in Yama's realm that holds our heroes,
Immortals mounted on the chariot's axle,—
Let him speak out who understands this saying.
- (7) The glorious bird (the sun) has lighted-up the heaven,
The guide divine, whose wings are deeply sounding;
Where is the sun? Who knows it now, to tell us,
Which of the heavens his ray may have illumined?

Naturally, the sun was first addressed when seen through the vapor-sky, where in the imagination he appeared as a spirit riding in a golden chariot, drawn by brilliant horses. The next step noted is that the figurative speech remained after the canopy and vapor-belt had passed away and the sun was seen in its true glory. Thus we read, Rig-Veda i, 27, 10:

The stars fixed high in heaven and shining brightly
By night, O say, where have they gone by day-time?
The laws of Varuna are everlasting,
The moon moves on by night in brilliant splendor.

It does not follow from this that because the stars were seen the last canopy or ring had dissipated. This evidence is simply to be classed with the records which the ancient Chinese, Egyptians, and Chaldeans kept of the eclipses. These records, together with the other astronomical data of the ancients, merely show that the true sky was seen at times. Yea, even if we are forced to grant that the skies were completely cleared from all belted-cloud phenomena at the time of these recorded astronomical events, it only removes the actual appearances of the cloud phenomena into a more

remote past. Who can gainsay such evidence as is found in the following (hymn X, 129) :

Nor aught nor naught existed: yon bright sky
Was not, nor heaven's broad woof outstretched above;
What covered all? what sheltered? what concealed?
Was it the waters' fathomless abyss?

Again we quote from the same hymn:

Darkness there was, and all at first was veiled
In gloom profound, an ocean without light;
The germ that still lay covered in the husk
Burst forth, one nature, from the fervent heat.

Here is another selection taken from the Hymn, To Râtrî, Night.

- (1) The Night comes near and looks about,
The goddess with her many eyes,
She has put on her glories all.
- (2) Immortal, she has filled the space,
Both far and wide, both low and high,
She conquers darkness with her light.
- (3) She has undone her sister, Dawn,
The goddess Night, as she approached,
And utter darkness flies away.

Max Müller says: "We must remember that the night to the Vedic poet was not the same as darkness, but that, on the contrary, when the night had driven away the day, she was supposed to lighten the darkness, and even to rival her sister, the bright day, with her starlight beauty. The night, no doubt, gives peace and rest, yet the Dawn is looked upon as the kindlier light, and is implored to free mortals from the dangers of the night, as debtors are freed from a debt. Many conjectural alterations have been proposed in this hymn, but it seems to me to be intelligible as it stands."¹²

From the standpoint of the additional light shed by the

¹² "Auld Lang Syne," Second Series, p. 255.

present hypothesis, this hymn becomes still more intelligible. At night the sunlight from below illuminated the canopy; in the words of the hymn, "She conquered darkness with her light." In connection with the lesson of the pyramids, this hymn becomes clearer, and the midnight hour of the "shade" and of "Death" is indeed a revelation.

- (8) Like cows, I brought this hymn to thee,
As to a conqueror, child of Dyaus.
Accept it graciously, O Night!

The "cows" mentioned in the text refers without question to the clouds, and brings at once to our attention all the solar bulls of mythology. Saramâ had cloud-cattle stolen by the Pani-robbers. Saramâ went after them, and the following conversation took place:

"*The Panis*: 'With what intention did Saramâ reach this place? for the way is far and leads tortuously away. What is thy wish with us? Didst travel safely? (or, 'how was the night?') How didst thou cross the waters of the Rasâ?'

"*Saramâ*: 'I came sent as the messenger of Indra, desiring, O Panis, your great treasures. This preserved me from the fear of crossing, and thus I crossed the waters of the Rasâ.'

"*The Panis*: 'Who is he? what looks he like, this Indra, whose herald you have hastened from afar? Let him come here, we will make friends with him, then he may be the herdsman of our cows.'

"*Saramâ*: 'Ye cannot injure him, but he can injure, whose herald I have hastened from afar. Deep rivers cannot overwhelm him; you, Panis, soon shall be cut down by Indra.'

"*The Panis*: 'Those cows, O Saramâ, which thou cam'st to seek, are flying round the ends of the sky. O darling, who would give up to thee without a fight? for, in truth, our weapons too are sharp.'"¹³

¹³ Rig-Veda x, 108. Ragozin, "Vedic India," p. 257.

We have already sketched some of the attributes of Indra, the conquering sun. He was also a cow or cloud disperser. He slew the awful "demon-cloud"; also Val or Vritra, him of speed, the great snake, the great restrainer. He, men, was Indra, the cloud compeller.

"He who fixed firm the moving earth; who tranquillized the incensed mountains; who spread the spacious firmament; who consolidated the heavens: he, men, is Indra.

"He who, having destroyed Ahi, set free the seven rivers; who recovered the cows retained by Bal; who generated fire in the clouds; who is invincible in battle; he, men, is Indra."¹⁴

It is an interesting fact that England's patron, Saint George, is borrowed from this scene. The battle of Indra and Ahi is analogous and equivalent to that between Saint George and the Dragon. Other prototypes are Hercules and the Hydra, Perseus and the sea-monster, Sigurd and Fafnir, Beowulf and Grendel. "All this is descriptive of the deliverance of the earth," says Charles De B. Mills, "from the fangs of a monster, either the storm-cloud—in the case of Herakles the throttling serpents of night—or the icy prison of cold, of winter." Nay, but we know that it is all summed up in one monster—the overhanging snake-belt under the canopy.

Mr. Mills goes on to say: "What causes surprise is the universality of this speech. It is everywhere, certainly wherever any of the Aryan race are found. Nay, there are traces of the same essential story in the literatures of the Phœnicians, Egyptians, and Babylonians. In Saint George we have the myth Christianized, touched afresh with new colors, and the hero thus presented has become one of the most venerated and popular of all the saints in the calendar. The patron saint of England now since early in the fifteenth century, he has been also that of Aragon and Portugal, and

¹⁴ Murray's Manual of Mythology, 20th ed., p. 372.

the order of the knights of Saint George has been widely instituted. In the time of the crusades he appeared once in light on the walls of Jerusalem, waving his sword, and led the victorious assault on the Holy City. Is it not wonderful that he has been so long and gratefully remembered? ”¹⁵

Sky-scenes were essentially ephemeral, thus all through Vedic literature the changing of names and of the meanings of words is in evidence, and so just as we have seen the English saint, originally a sun-god, become a being leading armies of men to victory, so also the Hindus, like all the other peoples of their day (and of the days that have since passed), endeavored to keep abreast of the times. Deva Sūrya, ‘shining one,’ is an illustration of this truth. Sūrya means the red ball of the sun; afterwards he became Savitar, ‘enliverer.’ He proved to be the burner death.¹⁶ This burning one was the racing canopy. Max Müller says of it:

“One of the most intelligible names given to the sun was Asva, the racer, or Dadhikrâvan or Vâgin (horse). And while at one time the sun was a racer, at another the sun was conceived as approaching men and standing on a chariot which was drawn by horses, as in Greek mythology. Thus we read, Rig-Veda i, 35, 2: ‘The god Savitrî (the sun), approaching on the dark-blue sky, sustaining mortals and immortals, comes on his golden chariot, beholding all the worlds.’ ”¹⁷

Hopkins gives the hymn as follows:

Through space of darkness wending comes he hither,
Who puts to rest th’ immortal and the mortal,
On golden car existent things beholding,
The god that rouses, Savitar, the shining;
Comes he, the shining one, comes forward, upward,
Comes with two yellow steeds, the god reverèd,
Comes shining Savitar from out the distance,
All difficulties far away compelling.
His pearl-adorned, high, variegated chariot,

¹⁵ “The Tree of Mythology,” pp. 76-77. ¹⁶ Rig-Veda, liv, 2.

¹⁷ “Auld Lang Syne,” Second Series, p. 194.

Of which the pole is golden, he, reverèd,
 Hath mounted, Savitar, whose beams are brilliant,
 Against the darksome spaces strength assuming.
 Among the people gaze the brown white-footed
 (Steeds) that the chariot drag whose pole is golden.
 All peoples stand, and all things made, forever,
 Within the lap of Savitar, the heavenly.

(There are three heavens of Savitar, two low ones,
 One, men-restraining, in the realm of Yama.
 As on (his) chariot-pole stand all immortals,
 Let him declare it who has understood it!)

Across air-spaces gazes he, the eagle,
 Who moves in secret, th' Asura, well-guiding,
 Where is (bright) Sūrya now? who understands it?
 And through which sky is now his ray extending?¹⁸

It has already been pointed out that the Acvins were the two halves of the divided canopy. They were like two great mountains, the one to the north, the other in the south. Warren says of them:

"A striking parallel to the Egyptian and Akkadian idea of two opposed polar mountains, an arctic and an antarctic—the one celestial and the other infernal—is found among the ancient inhabitants of India. The celestial mountain they called Su-Meru, the infernal one Ku-Meru. In the Hindu Puranas the size and splendors of the former are presented in the wildest exaggerations of Oriental fancy. Its height, according to some accounts, is not less than eight hundred and forty thousand miles, its diameter at the summit three hundred and twenty thousand. Four enormous buttress mountains, situated at mutually opposite points of the horizon, surround it. One account makes the eastern side of Meru of the color of the ruby, its southern that of the lotus, its western that of gold, its northern that of coral. On its summit is the vast city of Brahma, fourteen thousand leagues in extent. Around it, in the cardinal points and the inter-

¹⁸ "Religions of India," p. 49, Rig-Veda i, 35.

mediate quarters, are situated the magnificent cities of Indra and the other regents of the spheres. The city of Brahma, in the centre of the eight, is surrounded by a moat of sweet flowing celestial waters, a kind of river of the water of life (Gangâ), which, after encircling the city, divides into four mighty rivers flowing towards four opposite points of the horizon, and descending into the equatorial ocean which engirdles the earth.

"Sometimes Mount Meru is represented as planted so firmly and deeply in the globe that the antarctic or infernal mountain is only a projection of its lower end. Thus the Sûrya Siddhânta says: 'A collection of manifold jewels, a mountain of gold, is Meru, passing through the middle of the earth-globe (*bhugola*), and protruding on either side. At its upper end are stationed along with Indra the gods and the great sages (*maharishis*); at its lower end, in like manner, the demons have their abode—each (class) the enemy of the other. Surrounding it on every side is fixed, next, this great ocean, like a girdle about the earth, separating the two hemispheres of the gods and of the demons.'" ¹⁹

The four mighty rivers above referred to as flowing downwards towards the four opposite points of the horizon were four snakes. At an early date in the mythology of the Hindus the great snakes and the little snakes are said to have taken sides. Divine snakes grouped with other celestial powers disputed for victory over earthly combatants. This is a record of the fact that as time wore on the cult which owed its origin to the original sky-scenes was becoming contaminated. The scenes that gave birth to the myths had passed away and the people were prone to forget. In a footnote on these times Hopkins says:

"The snakes belong to Varuna and his region, as described in v. 98. It is on the head of the earth-upholding snake Cesha that Vishnu muses, iii, 203, 12. The reverence

¹⁹ "Paradise Found," pp. 129-130.

paid to serpents begins to be ritual in the Atharva Veda. Even in the Rig Veda there is the deification of the cloud-snake. In later times they answered to the Nymphs, being tutelary guardians of streams and rivers (Bühler). In i, 36, Cesha Ananta supports earth, and it is told why he does so." ²⁰

Vishnu means "knowledge." Avatar means "Descent from somewheres to this earth." The gods descended when the canopy fell and brought knowledge to men.

The duration of the time of the gods' own lives and of the divine heavens, unlike the Greeks' notion of the four ages which include all time, in India embraces only a fraction of time.

"Starting at any one point of eternity, there is, according to the Hindu belief," says Hopkins, "a preliminary 'dawn' of a new cycle of ages. This dawn lasts four hundred years, and is then followed by the real age (the first of four), which last four thousand years, and has again a twilight ending of four hundred years in addition. This first is the Krita age, corresponding to the classical Golden Age. Its characteristics are that in it everything is perfect; right eternal now exists in full power." ²¹

These ages are a long-drawn-out affair. No doubt the epoch-making events of canopy decline through which primitive man passed moulded his thoughts in this direction and gave birth to the idea of dividing time up into ages. In Hindu expression, this cycle of the ages always repeats itself anew.

The four horses of Revelations (ch. vi) are another instance of the fourfold division of early time. In all parts of the world the same divisions seem to have been observed, and the inference is that there actually was something in canopy time which caused these ages to be noted.

²⁰ "The Religions of India," chap. xiv, p. 376.

²¹ "Religions of India," ch. xv, p. 419.

"The 'Popul Vuh,' the national book of the Quiches, tells us of four ages of the world. The man of the first age was made of clay; he was 'strengthless, inept, watery; he could not move his head, his face looked but one way; his sight was restricted, he could not look behind him' (that is, he had no knowledge of the past); 'he had been endowed with language, but he had no intelligence, so he was consumed in the water.'

"Then followed a higher race of men; they filled the world with their progeny; they had intelligence but no moral sense; 'they forgot the Heart of Heaven.' They were destroyed by fire and pitch from heaven, accompanied by tremendous earthquakes, from which only a few escaped.

"Then followed a period when all was dark, save the white light as yet of the primeval world.

"Once more are the gods in council, in the darkness, in the night of a desolated universe.

"Then the people prayed to God for light, evidently for the return of the sun.

"'Hail! O Creator!' they cried. 'O Former! Thou that hearest and understandest us! abandon us not! forsake us not! O God, thou art in heaven and on earth; O Heart of Heaven! O Heart of Earth! give us descendants, and a posterity as long as the light endure.'

"It was thus they spake, living tranquilly, invoking the return of the light; waiting the rising of the sun; watching the star of the morning, precursor of the sun. But no sun came, and the four men and their descendants grew uneasy. 'We have no person to watch over us,' they said; 'nothing to guard our symbols!' Then they adopted gods of their own, and waited. They kindled fires, for the climate was colder; then there fell great rains and hail-storms, and put out their fires. Several times they made fires, and several times the rains and storms extinguished them. Many other trials also they underwent in Tulan, famines and such things,

and a general dampness and cold—for the earth was moist, there being no sun. * * *

“Many generations seem to have grown up and perished under the sunless skies, ‘waiting for the return of the light’; for the ‘Popul Vuh’ tells us that ‘here also the language of all the families was confused, so that no one of the first four men could any longer understand the speech of the others.’ * * *

“This shows that many, many years—it may be centuries—must have elapsed before that vast volume of moisture, carried up by evaporation, was able to fall back in snow and rain to the land and sea, and allow the sun to shine through ‘the blanket of the dark.’ Starvation encountered the scattered fragments of mankind.

“And in these same Quiche legends of Central America we are told: ‘The persons of the godhead were enveloped in the darkness which enshrouded a desolated world.’ ”²²

“The Aztecs,” says Prescott, “felt the curiosity, common to man in almost every stage of civilization, to lift the veil which covers the mysterious past and the more awful future. They sought relief, like the nations of the Old Continent, from the oppressive idea of eternity, by breaking it up into distinct cycles, or periods of time, each of several thousand years’ duration. There were four of these cycles, and at the end of each, by the agency of one of the elements, the human family was swept from the earth, and the sun blotted out from the heavens, to be again rekindled.”²³

Quetzalcoatl was the god of the air, the good canopy. “Under him,” says Prescott, “the earth teemed with fruits and flowers, without the pains of culture. An ear of Indian corn was as much as a single man could carry. The cotton, as it grew, took, of its own accord, the rich dyes of human

²² Bancroft's “Native Races,” vol. iii, p. 46, as quoted by Donnelly in “Ragnarok,” pp. 216–218.

²³ “History of the Conquest of Mexico,” vol. i, ch. iii, p. 64.

art. The air was filled with intoxicating perfumes and the sweet melody of birds. In short, these were the halcyon days, which find a place in the mythic systems of so many nations in the Old World. It was the *golden age* of Anahuac.”²⁴

“The reader has already been made acquainted with the Aztec system of four great cycles,” says the famous historian, “at the end of each of which the world was destroyed, to be again regenerated. The belief in these periodical convulsions of nature, through the agency of some one or other of the elements, was familiar to many countries in the Eastern hemisphere; and, though varying in detail, the general resemblance of outline furnishes an argument in favor of a common origin.

“No tradition has been more widely spread among nations than that of a Deluge. Independently of tradition, indeed, it would seem to be naturally suggested by the interior structure of the earth, and by the elevated places on which marine substances are found to be deposited. It was the received notion, under some form or other, of the most civilized people in the Old World, and of the barbarians of the New. The Aztecs combined with this some particular circumstances of a more arbitrary character, resembling the accounts of the East. They believed that two persons survived the Deluge—a man, named Coxcox, and his wife. Their heads are represented in ancient paintings, together with a boat floating on the waters, at the foot of a mountain. A dove is also depicted, with the hieroglyphical emblem of languages in his mouth, which he is distributing to the children of Coxcox, who were born dumb. The neighboring people of Michoacán, inhabiting the same high plains of the Andes, had a still further tradition, that the boat in which Tezpi, their Noah, escaped, was filled with various kinds of animals and birds. After some time, a vulture was sent out from it, but remained feeding on the dead bodies of

²⁴ *Ibid.*, p. 61.

the giants, which had been left on the earth, as the waters subsided. The little humming-bird, *huitzitzilin*, was then sent forth, and returned with a twig in its mouth. The coincidence of both these accounts with the Hebrew and Chaldean narratives is obvious. It were to be wished that the authority for the Michoacán version were more satisfactory.”²⁵

This account of the Deluge, though evidently grafted from the Old World, brings us back to our Hindu legends. Manu was the Hindu Noah. The human race, according to this legend, was preserved through a compact which was made between him and the god, Vishnu, who was incarnate in many strange forms and things, each one of which was an avatar. The account of the famous flood avatar is as follows:

“In the morning they brought water to Manu to wash with, even as they bring it to-day to wash hands with. While he was washing a fish came into his hands. The fish said, ‘Keep me, and I will save thee.’ ‘What wilt thou save me from?’ ‘A flood will sweep away all creatures on earth. I will save thee from that.’ ‘How am I to keep thee?’ ‘As long as we are small,’ said he (the fish), ‘we are subject to much destruction; fish eats fish. Thou shalt keep me first in a jar. When I outgrow that, thou shalt dig a hole, and keep me in it. When I outgrow that, thou shalt take me down to the sea, for there I shall be beyond destruction.’

“It soon became a (great horned fish called a) *jhasha*, for this grows the largest, and then it said: ‘The flood will come this summer (or in such a year). Look out for (or worship) me, and build a ship. When the flood rises, enter into the ship, and I will save thee.’ After he had kept it he took it down to the sea. And the same summer (year) as the fish had told him he looked out for (or worshiped) the fish; and built a ship. And when the flood rose he entered into the ship. Then up swam the fish, and Manu tied the ship’s

²⁵ *Ibid.*, vol. iii, appendix, part i, pp. 362-364.

rope to the horn of the fish; and thus he sailed swiftly up toward the mountain of the north. 'I have saved thee,' said he (the fish). 'Fasten the ship to a tree. But let not the water leave thee stranded while thou art on the mountain (top). Descend slowly as the water goes down.' So he descended slowly, and that descent of the mountain of the north is called the 'Descent of Manu.' The flood then swept off all the creatures of the earth, and Manu here remained alone."²⁶

This avatar speaks plainly of the descent of both gods and water to this earth. Vishnu is said to have lain on a bed of snakes, so the unknown source, the somewheres of the myth, is clearly the vapor-belt on high. First Vishnu took the form of a fish. In a later avatar he became a strong tortoise, upholding the sky-rim-disk.

Another avatar is thus described by Maurice: "By the power of God there issued from the essence of Brahma a being shaped like a boar, white and exceeding small; this being, in the space of an hour, grew to the size of an elephant of the largest size, and remained in the air.

"Brahma was astonished on beholding this figure, and discovered, by the force of internal penetration, that it could be nothing but the power of the Omnipotent which had assumed a body and become visible. He now felt that God is all in all, and all is from him, and all in him; and said to Mareechee and his sons (the attendant genii): 'A wonderful animal has emanated from my essence; at first of the smallest size, it has in one hour increased to this enormous bulk, and, without doubt, it is a portion of the almighty power.'

"They were engaged in this conversation when that vara, or 'boar-form,' suddenly uttered a sound like the loudest thunder, and the echo reverberated and shook all the quarters of the universe.

²⁶ Hopkins, "The Religions of India," ch. ix, pp. 214-215.

“ But still, under this dreadful awe of heaven, a certain wonderful divine confidence secretly animated the hearts of Brahma, Mareechee, and the other genii, who immediately began praises and thanksgiving. That vara (boar-form) figure, hearing the power of the Vedas and Mantras from their mouths, again made a loud noise, and became a dreadful spectacle. Shaking the full flowing mane which hung down his neck on both sides, and erecting the humid hairs of his body, he proudly displayed his two most exceedingly white tusks; then, rolling about his wine-colored (red) eyes and erecting his tail, he descended from the region of the air, and plunged headforemost into the water. The whole body of water was convulsed by the motion, and began to rise in waves, while the guardian spirit of the sea, being terrified, began to tremble for his domain and cry for mercy.” ²⁷

The avatars that follow are nothing but husks built up to sustain the priestly cult. But we must not omit mentioning Vâsuka, the King of Serpents, who was made into a rope to twirl the churn of heaven. It is said that he churned the foaming waters of the sea until the milky waves arose, lashed to whiteness, and in the midst of these mighty convulsions he caused the storm to bring the things of beauty out from the heaving bosom of the deep to their birth.

²⁷ “Ancient History of Hindustan,” vol. i, p. 304.

CHAPTER XV

BABYLONIAN AND ASSYRIAN MYTHS

THE fourth avatar of Vishnu, as we have just seen in our last chapter, was that of the great mountain, "Mandara the lofty," which acted as a churning stick to stir the foaming waters of the vapor-belt, the King snake being used as a rope to twirl the stick around. Now, the cloud-mountain always was the home of the gods. The Greeks had their Olympia, the North American Indians had their sky-mountain, and the Mohammedan mythology records the fact that Mount Caf, which encircled the earth, was the home of giants. It was said to rest upon the sacred emerald-colored stone, sakhral, whose reflected light was the cause of the tints of the sky. The Scandinavian myths also mention the mountain giants, and the Egyptians had their pyramids. That the Babylonian gods lived above or on top of the world-mountain therefore seems quite natural. "The mountain of the world is also called 'the mountain of the nether world' (shad Arâlu) in the cuneiform inscriptions." The gods, Ea, Sin, Shamash, Nebo, Adad, Ninib, and their sublime consorts, were all born in a house situated on top of this mountain.¹

In some form or other, nearly all the peoples of antiquity have left a record of this sky-mountain phenomena, but perhaps the Babylonians and Assyrians have excelled them all. Their zikkurats, or staged towers, were imitations of this mountain,² and they were the temples of their gods. "The

¹"Explorations in Bible Lands During the Nineteenth Century," pp. 464-465.

²"To produce the mountain effect, a mound of earth was piled up, and on this mound a terrace was formed that served as the foundation plane for the temple proper, but it was perfectly natural also that

temple in so far as it was erected to serve as a habitation for the god," says Jastrow, "was to be the reproduction of the cosmic E-Kur—"a mountain house" on a small scale, a miniature Kharsag-kurkura." * * * "In Assyria we find one of the oldest temples bearing the name E-kharsag-kurkura, that stamps the edifice as the reproduction of the 'mountain of all lands.'" ³

Some of the mountain titles of these deities and their temples were as follows: The name 'zikkurat' itself means 'mountain peak.' Bel's temple at Nippur was 'E-Kur,' the mountain house of Bel. Belit, his consort, was called 'Nin-Khar-Sag,' or the 'lady of the great high mountain.' Bel was often addressed as if he himself were the mountain: 'the great mountain,' 'the lofty Bel,' 'the mighty Bel.' Originally he was the mountain mass in the sky. His deification did not rob him of his name.

In Ur was 'the house of the great mountain,' 'the glorious mountain house,' 'the lofty house,' 'the heavenly house,' 'the link of heaven and earth,' 'the summit house.'

In Asshur there was 'the house of all the lands' or 'the house of mountains,' 'the house of the mountain of countries.'

At Babylon 'the great house' was an abode of the same nature. Here the mountain-god was called Marduk, from Maru ('the sun') Duk (u) ('the glorious chamber')⁴: the glorious chamber of the hidden sun. The gods lived in chambers. Jastrow says:

"As the zikkurat represented the mountain on which the gods were born and where they were once supposed to dwell, so the sacred room was regarded as the reproduction of a

instead of making the edifice consist of one story, a second was superimposed on the first, so as to heighten the resemblance to a mountain. The outcome of this ideal was the so-called staged tower, known as the *zikkurat*. The name signifies simply a 'high' edifice, and embodies the same idea that led the Canaanites and Hebrews to call their temples 'high places.' Jastrow, "Religion of Babylonia and Assyria," ch. xxvi, p. 615. ³ *Ibid.*, pp. 614, 615. ⁴ *Ibid.*, ch. viii, p. 116.

portion of the great mountain where the gods assembled in solemn council. This council chamber was situated at the eastern end of the great mountain, and was known as Du-azagga, that is, 'brilliant chamber.' The chamber itself constituted the innermost recess of the eastern limit of the mountain, and the special part of the mountain in which it lay was known as Ubshu-kenna, written with the ideographic equivalents to 'assembly room.'"⁵

Bel of Nippur became associated with Marduk of Babylon. The union of the governments of the two cities blended the one god into the other until finally they became united as one deity. Both were solar characters. Probably they represented the same aspect of abstract nature, and since their affinities were the same their union was the logical result when the peoples of the two cities came to realize that they were worshipping the same nature-being. In both places they were worshipping the same god-like mountain.⁶

The union of Bel-Marduk is only one instance of an innumerable host of similar occurrences. Take the leviathan which we read about in Job. He is the crooked serpent (Job xxvi: 13; Ps. xxxiii: 6-7; Isa. xxvii: 1). The swift Acvin or northern canopy of the Hindus, etc., etc. And yet how quickly he becomes associated with our present scene. It is written of him: "He beholdeth all high things; he is a king over all the children of pride." Chaldaic: "of all the sons of the mountains" (Job xli: 34).

⁵ *Ibid.*, ch. xxvi, p. 629.

⁶ Marduk was the bright glowing, shining canopy-mountain. He was not the sun itself; only the shiner which was lit by reflection, even at night. Those who believe that his temple, E-Sagili, was a sun-temple will have some difficulty to explain the night prayers that formed a part of his worship. Sayce (Hibbert Lectures, p. 101) says: "Two hours after nightfall the priest must come and take of the waters of the river; must enter into the presence of Bil, and, putting on a stole in the presence of Bil, must say this prayer, etc."

Ishtar was originally a good canopy. Personified, she was known as 'the mother,' for the reason that she seemed to give birth to all the sky phenomena.⁷ She was also known as the 'brilliant goddess,' and as 'the mistress of the mountains.' Afterwards she became violent, and the verdant earth under her greenhouse roof trembled. Thus she lost her good character, and the Assyrians, seeing her transformation, henceforth considered her the goddess of battle and war. Her character is like that of the good cherub of Ezekiel (chap. xxviii), who afterwards became a menace and terror. Of this canopy it is written that he was set like Ishtar on the holy mountain. The passage reads as follows:

"Thou art the anointed cherub that covereth; and I have set thee so: thou wast upon the holy mountain of God; thou hast walked up and down in the midst of the stones of fire.

"Thou wast perfect in thy ways from the day that thou wast created, till iniquity was found in thee.

"By the multitude of thy merchandise they have filled the midst of thee with violence, and thou hast sinned: therefore I will cast thee as profane out of the mountain of God: and I will destroy thee, O covering cherub, from the midst of the stones of fire" (vs. 14-16).

In the cosmology of the Chaldeans the mountain of the canopy is very prominent. They imagined that the earth was shaped like an inverted round boat or bowl. A. H. Sayce is authority for the following:

"Heaven itself had not always been 'the land of the silver sky' of later Assyrian belief. The Babylonians once believed that the gods inhabited the snow-clad peak of Rowandiz, 'the mountain of the world' and 'the mountain of the East,' as it was also termed, which supported the

⁷"The mother" was a common appellation given to the canopy in all ancient systems of religion.

starry vault of heaven. It is to this old Babylonian belief that allusion is made in Isaiah xiv: 13, 14, where the Babylonian monarch is represented as saying in his heart: 'I will ascend into heaven, I will sit also on the mount of the assembly (of the gods) in the extremities of the north: I will ascend above the heights of the clouds.'"⁸

"Above the convex surface of the earth," Ragozin says, "spread the sky (*ana*), itself divided into two regions: the highest heaven or firmament, which, with the fixed stars immovably attached to it, revolved, as round an axis or pivot, around an immensely high mountain, which joined it to the earth as a pillar. * * *

"Between the lower heaven and the surface of the earth is the atmospheric region, the realm of *Im* or *Mermer*, the Wind, where he drives the clouds, rouses the storms, and whence he pours down the rain, which is stored in the great reservoir of *Ana*, in the heavenly Ocean. As to the earthly Ocean, it is fancied as a broad river, or watery rim, flowing all round the edge of the imaginary inverted bowl; in its waters dwells *Ea* (whose name means 'the House of Waters'), the great Spirit of the Earth and Waters (*Ziki-a*), either in the form of a fish, whence he is frequently called 'Ea the fish,' or 'the Exalted Fish,' or on a magnificent ship, with which he travels round the earth, guarding and protecting it."⁹

The people of those early days naturally speculated on the question as to what held the hollow hemisphere of the stretched-out heaven in place. It appeared to them as a solid dome or covering. The Assyriologist of the British Museum, L. W. King, gives us some account of their ideas on this subject. He tells us that they thought that "both earth and heaven rested upon a great body of water called *Apsū*, i.e., the Deep." Again, some say:

⁸"By-Paths of Bible Knowledge," vii; "Assyria," ch. iii, p. 77.

⁹"The Story of Chaldea," pp. 153, 154.

"It is not quite certain how the solid dome of heaven was supported; that is to say, it is not clear whether it was supported by the earth or was held up, independently of the earth, by the waters. According to one view, the edge of the earth was turned up and formed around it a solid wall, like a steep range of hills, upon which the dome of heaven rested; and in the hollow between the mountain of the earth and this outer wall of hills the sea collected in the form of a narrow stream.¹⁰ This conception coincides with some of the phases in the Legend of Etana, but against it may be urged the fact that the sea is frequently identified with Apsū, or the primeval Deep upon which the earth rested. But if the edges of the earth supported the dome of heaven, all communication between the sea and Apsū would be cut off. It is more probable, therefore, that the earth did not support the heavens, and that the foundations of the heavens, like those of the earth, rested on Apsū." This confusion

¹⁰ The original stream of the Eden World is here portrayed. It is written: "A river went out of Eden to water the garden; and from thence it was parted, and became into four heads. The name of the first is Pison: that is it which compasseth the whole land of Havilah, where there is gold; and the gold of that land is good: there is bdellium and the onyx stone. And the name of the second river is Gihon: the same is it that compasseth the whole land of Ethiopia. And the name of the third river is Hiddekel: that is it which goeth toward the east of Assyria. And the fourth river is Euphrates." (Gen. ii:10-14.) William F. Warren says:

"Finally, pursuing these curious investigations further, our plain reader finds mention in Pausanias, ii, 5, of a strange belief of the ancients, according to which the Euphrates, after disappearing in a marsh and flowing a long distance underground, rises again beyond Ethiopia, and flows through Egypt as the Nile. This reminds him of the language of Josephus, according to which the Ganges, the Tigris, the Euphrates, and the Nile are all but parts of 'one river which ran round about the whole earth'—the Okeanos-river of the Greeks. And he wonders whether the old Shemitic term from which the modern Euphrates is derived was not originally a name of that Ocean-river which Aristotle describes as rising in the upper heavens, descending in rain upon the earth, feeding, as Homer tells us, all fountains and

arises from the fact that the Chaldeans themselves did not understand the workings of the laws which upheld the dome. They therefore felt certain that it must rest on some foundation, for they saw it descending, as it were, both on the right hand and on the left, both to the East and to the West.

Our author describes the origin of the dome as follows: "According to a version of the creation story, the god Bel or Marduk formed the heavens and the earth out of the body of a great female monster that dwelt in the Deep which he had slain. Splitting her body into two halves, he fashioned from one half the dome of heaven, and from the other the earth."¹¹

Above the dome of heaven, according to the ancient belief, was another mass of water, supported by the lower dome which kept it from breaking through and drowning the earth. The interpretation of this is that the dome of heaven was a canopy in its last stages, hence so thin that the sun, moon,

rivers and every sea, flowing through all these water-courses down into the great and 'broad' equatorial ocean-current which girdles the world in its embrace, thence branching out from the further shore into the rivers of the Underworld, to be at last fire-purged and sublimated, and returned in purity to the upper heavens to recommence its round. And just as he is wondering over the question, he finds that some of the Assyriologists, in their investigation of pre-Babylonian Akkadian mythology, have found reason to believe this surmise correct, and to say that in that mythology the term Euphrates was applied to 'the rope of the world,' 'the encircling river of the snake god of the tree of life,' 'the heavenly river which surrounds the earth.' Furthermore, as he turns back to the pages of Hyginus, and Manilius, and Lucius Ampelius, and reads of the fall of the 'world-egg' at the beginning 'into the river Euphrates,' he perceives that he is in a mythologic, and not a historic, region. And when he lights upon a mutilated fragment of an ancient Assyrian inscription, in which descriptions of the visible and invisible world are mixed up together, and in which the river 'of the life of the world' is designated by the name 'Euphrates,' he quickly concludes that it will not do to take the term Phrath, or Eu-frata, as always and everywhere referring to the historic river of Mesopotamia." ("Paradise Found," pp. 30, 31.)

¹¹ "Babylonian Religion and Mythology," vol. iv, pp. 28, 30, 31.

and stars were seen as gods drifting through its substance in halos or boats. Herodotus says, the boats of the Babylonians and Assyrians were circular, like a shield, and no distinction was made between the head and the stern.¹² In this way the mythological idea of the gods journeying in boats had its beginning. From the parent conception it was only a step to introduce the boat-procession into the various priestly cults as practised in Egypt and elsewhere.¹³ There is splendid poetry in the following hymn: "O Sun! thou hast stepped forth from the background of heaven, thou hast pushed back the bolts of the brilliant heaven,—yea, the gate of heaven. O Sun! above the land thou hast raised thy head! O Sun! thou hast covered the immeasurable space of heaven and countries!"¹⁴

But besides seeing the daily procession of the gods, headed by the Sun, stepping out from behind the Mountain of the Sunrise and drifting in his boat towards the Mountain of the Sunset, these Babylonians also saw the true canopy soaring above the vapor dome. This they naturally supposed was supported by the lower cloud belt or mountain.

¹² Bk. i, ch. 194.

¹³ "A sacred object in the construction of which much care was taken was the ship in which the deity was carried in solemn procession. It is again in the inscriptions of Gudea that we come across the first mention of this ship. This ruler tells us that he built the 'beloved ship' for Nin-girsu, and gave it the name Kar-nuna-ta-uddua, the ship of 'the one that rises up out of the dam of the deep.' The ship of Nabu is of considerable size, and is fitted out with a captain and crew, has masts and compartments. The ship resembled a moon's crescent, not differing much, therefore, from the ordinary flat-bottomed Babylonian boat with upturned edges. Through Nebuchadnezzar we learn that these ships were brilliantly studded with precious stones, their compartments handsomely fitted out, and that in them the gods were carried in solemn procession on the festivals celebrated in their honor. A long list of such ships shows that it was a symbol that belonged to all the great gods. The ships of Nin-lil, Ea, Marduk, Sin, Shamash, Nabu, Ninib, Bau, Nin-gal, and of others are especially mentioned." Jastrow, "Religion of Babylonia and Assyria," ch. xxvi, pp. 653-655.

¹⁴ Ragozin, "Story of Chaldea," ch. iii, p. 172.

Omoroka was the name of the woman which Bel cleft in twain, from one half of which he made the dome of heaven, and from the other half the earth. In Chaldee her name is Thamte, *i.e.*, tāmtu, the Babylonian for 'sea' or 'ocean,' which in the Greek is Thalassa.¹⁵ This Tiāmat or sea, according to the myth, took the form of a huge serpent, she and Apsū, her consort, revolted against the gods, that is against the sun, moon, and stars, by creating a brood of monsters which destroyed them. In other words, the serpent-belt became a sun-obscuring, star-devouring pall, a spreading canopy.

According to the beautiful Babylonian poem, the creation-epic, written upon seven tablets, this scene is depicted as follows: "At the very beginning of all things, a dark, chaotic, primeval water, called Tiāmat, existed in a state of agitation and tumult. But as soon as the gods made preparations for the formation of an ordered universe, Tiāmat, generally represented as a dragon, but also as a seven-headed serpent, arose in bitter enmity, gave birth to monsters filled with venom—and with these as her allies, prepared, roaring and snorting, to do battle with the gods. All the gods tremble with fear when they perceive their terrible adversary; only the god Marduk, the god of light, * * * volunteered to do battle. * * * A splendid scene follows. The god Marduk fastens a mighty net to the east and south, north and west, in order that nothing of Tiāmat may escape; then, clad in the gleaming armor, and in majestic splendor, he mounts his chariot drawn by four fiery steeds (a reference to the four halos or mock suns which accompanied the true sun on his diurnal journey over the canopy), the gods around gazing with admiration. Straight he drives to meet the dragon and her army. * * * Then her ground quaked

¹⁵ The Hebrew and Babylonian cosmogonies both present to us in the beginning a watery chaos. The Hebrew word *tehōm*, translated 'the deep' (Gen. i:2), corresponds with the Babylonian Tiāmat.

asunder from the bottom. She opened her jaws to their utmost, but before she could close her lips the god Marduk bade the evil wind enter within her. * * * Then Marduk clave Tiāmat clean asunder like a fish; out of the one half he formed heaven, out of the other, earth, at the same time dividing the upper waters from the lower by means of the firmament. He decked the heavens with moon, sun, and stars (which implies that they were not seen before), the earth with plants and animals." ¹⁶

She created a brood of uncouth beings, the same as we find in the giant myths of the Greeks and Scandinavians. The Babylonian version reads:

They have joined their forces and are making war,
 Ummu-Khubur (*i.e.*, Tiāmat), who formed all things,
 Has made in addition weapons invincible, she has spawned monster-serpents,
 Sharp of tooth and cruel of fang;
 With poison instead of blood she has filled their bodies.
 Fierce monster-vipers she has clothed with terror,
 With splendor she has decked them, and she has caused them to mount on high.
 Whoever beholds them is overcome by dread.
 Their bodies rear up and none can withstand their attack.
 She has set up the viper, and the dragon, and the monster Lakkamu."¹⁷

Attention is called to the second line quoted; there, it will be noted, Tiāmat is said to have created all things, hence this revolt against the gods was against her own offspring, which fact is sustained by various other Babylonian texts as well as by the myths of other lands. The interpretation is clear. When the first canopy known by tradition to the Babylonians became thin it gave birth to the gods; in other words, the sun, moon, and stars were seen through it. Then, as time went on, Marduk, *i.e.*, Bel, the solar deity, split up

¹⁶ Translated by C. H. W. Johns, "Babel and the Bible," pp. 47-49.

¹⁷ From the Tablets of the Creation epic; see Jastrow, "Religion of Babylon and Assyria," ch. xxi, p. 409 ff., and L. W. King, "Babylon Religion and Mythology," vol. iv, p. 63 ff.

another canopy which had formed and which was called the body of his mother. Out of half of her body he formed the dome of heaven and the waters which were seen above it, and out of the other half he formed the earth. Tiāmat then created other serpents from the sky-water or canopy above the firmament, a fearful brood of sun-obscuring, star-devouring, venomous serpents, annular forms, and lowering canopies.

The majority of scholars say that Marduk divided Tiāmat in half and from one half formed the earth. From the standpoint of the present hypothesis, this is in perfect harmony with the appearance of things, for to all intents and purposes, when the sun, Marduk, conquered the water-sky, half of it did seem to be cast upon the earth. Certain other scholars, however, say that the word, E-shara, translated earth, is incorrectly interpreted, and if this be true our hypothesis gains even more prestige, for the word they would substitute for earth means 'heaven.' L. W. King would have us "consider E-shara to be a name for heaven, or for a part of it," and he further adds in support of this assertion that "the last two lines of the Fourth Tablet of the poem certainly favor this view. The most natural meaning of the passage is that Marduk made the mansion of E-shara to be heaven, which he then divided between the three gods Anu, Bel, and Ea."

That we may have a better understanding of the argument we quote from the last twelve lines of the Fourth Tablet of the Creation Epic. It reads thus:

Then the lord rested, and gazed on her dead body.
He divided the flesh of the body, having devised a cunning plan.
He split her up like a flat fish into two halves.
One half of her he set in place as a covering for the heavens.
He fixed a bolt, he stationed watchmen,
And bade them not to let her waters come forth.
He passed through the heavens, he surveyed the regions (thereof),
Over against the Deep he set the dwelling of Nudimmud.

And the lord measured the structure of the Deep,
And he founded E-shara, a mansion like unto it.
The mansion E-shara, which he created as heaven,
He caused Anu, Bel, and Ea in their districts to inhabit."¹⁸

Our interpretation is that Marduk, *i.e.*, Bel, conquered Tīāmat, the serpent-belt or ring; that is, she was not a canopy in its last stages, but she was a serpent. Now, a serpent had to progress through the various stages of decline before it could be dissipated. Marduk divided the serpent-ring into two parts, the one resting towards the north and the other towards the south. This divided the heavens into three sections, one for each of the three gods, Bel giving to Anu the middle alley in the equatorial sky, where he had split the serpent in twain, and where of course the clear-sky could be seen. Anu was the god of the clear open sky. Naturally, in time the two halves, drifting towards the north and towards the south, became canopies. Bel dwelt in the northernmost one himself, and through it he could be seen crossing daily in his halo-boat. Hence we read that he caused these gods "their districts to inhabit."

It is an interesting probability that these tablets were not a new composition when written. They were found in Ashur-bāni-pal's library and date from the seventh century before Christ. But this does not indicate their age, for Ashur-bāni-pal was very fond of literature, and he collected his material from all over the country; therefore it is almost certain that these tablets were copied from older sources.

Another tablet, found in the same library, gives quite a variation in the portrayal of the combat. Were the legend a brand-new literary effort of the seventh century B. C. we should not expect to find such variations in the same library. It takes time to produce variant forms, especially when the matter is set forth in writing. All this goes to show that this mythological evidence may date from a very remote

¹⁸ "Babylonian Religion and Mythology," pp. 77, 78.

period. It is well to keep this fact ever in mind, for as we go on to consider the evidence from other and newer lands, we must remember that the people themselves never saw their own gods. Greece, for instance, retained, and in a measure beautified, the legends, but that is all they were to her. The natural phenomena had slipped so far away in the remote past that all that was left was legend.

This literary mist which has grown up and spread over and beautified the stern reality of nature is the soul of poetry. The Lord asks Job:

"Where wast thou when I laid the foundations of the earth? tell it, if thou hast any understanding (of it).

"Who fixed her measurements, if thou knowest it or who stretched the measuring-line over her?

"Upon what are her foundation-pillars placed at rest? or who laid her corner-stone?

"When altogether sang the morning stars in gladness, and shouted for joy all the sons of God?"¹⁹

But in considering the question of time we are likely also to err in the other direction; we are likely to assign these myths to a dust-mirky age entirely too far back. Knowledge of celestial phenomena on the part of the ancients does not always mean that the belted canopy phenomena had entirely disappeared. For instance, there can be no question but that the Babylonians were great astronomers. On a tablet found in the Temple Library, Nippur, astronomical calculations of the most minute character as to the constellation Scorpion show how proficient were the astronomers of 2300 B. C. But such evidence must not be understood to indicate that the annular system was a thing of the past in that age. It only indicates that the heavens were clear from canopies, and that the rings, if such were then in the sky, were probably seen edgewise, and so took up little space in

¹⁹ "Isaac Lesser's Version, Job xxxviii:4-7.

the equatorial heavens, being altogether an unobtrusive feature.²⁰

Professor H. V. Hilprecht's discoveries show amongst other things that these Babylonians were aware that the earth was round. They had the rings to guide them to the discovery of this truth, and the fact that the peoples which lived after them lost this knowledge shows us that the rings which acted as interpreters of nature must have passed into the canopy stage or have been dissipated altogether. With their disappearance the gods are said to have fled to the celestial heavens, where they ultimately became identified with the planets. Marduk is thus associated with Jupiter, Ishtar with Venus, Nergal with Mars, Nabu with Mercury, and Ninib with Saturn.²¹ The very act of thus connecting them

²⁰ The record of eclipses forms a very considerable portion of the astronomical data of the ancients. "Among the Chinese they were long calculated, and, in fact, it is thought by some that they have pretended to a greater antiquity by calculating backwards, and recording as observed eclipses those which happened before they understood or noticed them. It seems, however, authenticated that they did in the year 2169 B.C. observe an eclipse of the sun, and that at that date they were in the habit of predicting them. For this particular eclipse is said to have cost several of the astronomers their lives, as they had not calculated it rightly. As the lives of princes were supposed to be dependent on these eclipses, it became high treason to expose them to such a danger without forewarning them. They paid more attention to the eclipses of the sun than of the moon.

"Among the Babylonians the eclipses of the moon were observed from a very early date, and numerous records of them are contained in the Observations of Bel in Sargon's library, the tablets of which have lately been discovered. In the older portion they only record that on the 14th day of such and such a (lunar) month an eclipse takes place, and state in what watch it begins, and when it ends. In a later portion the observations were more precise, and the descriptions of the eclipse more accurate. Long before 1700 B.C. the discovery of the lunar cycle of 223 lunar months had been made, and by means of it they were able to state of each lunar eclipse that it was either 'according to calculation' or 'contrary to calculation.'" Flammarion, "Astronomical Myths," ch. xii, pp. 337-338.

²¹ Jastrow, "The Religion of Babylonia and Assyria," pp. 370, 371, 459.

with the star-roofed heavens points to the fact that they were originally sky-scenes. It would have violated the religious feelings of the people too much to restrict them to an earthly home, and yet their old cloud-mountain home had passed away, so where else in the whole universe could the priests say they had gone? In connection with the old cloud-mountain, the second month of the Babylonian year was designated as the month of the resplendent mound.²²

The origin of the signs of the zodiac was due to the same causes which led the Chaldean mind to assign planets to the gods, in which they might make their home after the mountain canopy had dissolved. "Eleven constellations, that is to say, the entire zodiac with the exception of the bull—the sign of Marduk—were identified with the eleven monsters forming the host of Tiāmat."²³ The fantastic shape of the animals chosen for this purpose bears unmistakable evidence of their origin as vapor forms.

But to return to the earlier days. It was Bel, as we have seen, that caused the gods, Anu, Bel, and Ea, their districts to inhabit.

A tablet of the 'Creation Epic,' so far as decipherable, reads:

There was a time when above the heaven was not named.
 Below the earth bore no name.
 Apsu was there from the first the source of both,
 And raging Tiāmat, the mother of both.
 But their waters were gathered together in a mass.
 No field was marked off, no soil seen.
 When none of the gods was as yet produced,
 No name mentioned, no fate determined,
 Then were created the gods in their totality.
 Lakhmu and Lakhamu were created.
 Days went by.²⁴

²² *Ibid.*, p. 464. ²³ *Ibid.*, p. 456.

²⁴ Delitzsch supplies a parallel phrase which in the light of our hypothesis makes the reading clearer. It is: 'periods elapsed.'

Anshar and Kishar were created.

Many days elapsed * * *

Anu (Bel and Ea were created).

Anshar, Anu (?) * * * ²⁵

The portion of the heavens given to Ea was Apsu, the deep. Ea means 'the House of waters.' He was an 'Exalted Fish.' This is parallel to that avatar of Vishnu where he assumed the form of a great fish protecting Manu from the flood. (The canopy was a protector, bringing greenhouse conditions into the world.) Ea fought against Tīāmat, the dragon, serpent snake, and with Marduk's and Anu's help conquered the dark one. Ea thus figures as the great hero of the flood, which parallels the account of the Noachian deluge, but as this incident is described in the eleventh tablet of the Gilgamesh epic, it will be best to defer its consideration until after we have become acquainted with some of the records from the first tablets.

This epic of Gilgamesh is known to many by the name of 'Izdubar.' "Gisdhubar," says Sayce, "himself was a solar hero." * * * "His twelve labors or adventures answer to the twelve months of the year through which the sun moves, like the twelve labors of the Greek Herakles." ²⁶

Now, in the sixth tablet, to secure the love of Gilgamesh, the solar orb, the exalted Ishtar, the one-time good canopy, 'brilliant goddess,' and 'mother of the gods,' raises her eyes. She offers him her love, her home, her all. She offers him the products of the mountain and the land, for she, the goddess of fertility, produced wonderful agricultural fruits under her protecting roof. She offers him full control of her herds and cow-like clouds. She offers him a chariot of lapis lazuli and gold, with wheels and horns of sapphire, drawn by great steeds—the swift horse being an emblem of the flying ring or vapor-belt driven by centrifugal force.

²⁵ *Ibid.*, ch. xxi, p. 410.

²⁶ "By-Paths of Bible Knowledge," vii. "Assyria," p. 110.

Gilgamesh spurns all this and upbraids her for her treatment of her youthful loves.

Tammuz, the consort of thy youth (?),
 Thou causest to weep every year.
 The bright-colored *allallu* bird thou didst love.
 Thou didst crush him and break his pinions.
 In the woods he stands and laments, "O my pinions!"
 Thou didst love a lion of perfect strength;
 Seven and seven times thou didst bury him in corners (?).
 Thou didst love a horse superior in the fray;
 With whip and spur thou didst urge him on.
 Thou didst force him on for seven double hours.²⁷

She could not stand this insult, so, flying to her father, Anu, the true sky, he creates for her a divine bull, a storm deity; apparently in this case a kind of demon.²⁸ The seal cylinders of Babylon frequently picture the battle that followed between this strong or supreme one and Gilgamesh and his friend Eabani. Since Gilgamesh is the sun, he of course conquered. The bull was killed and the carcass was thrown full into the face of the canopy (Ishtar).

Briefly this whole scene may be thus interpreted: Ishtar with her peace-like clouds was but a canopy in its last stages. Unveiled, it then displayed its violent character (Her). Its brilliant smiles produced a bitter chill, and Anu, heaven's ocean, her own father, was covered with the clouds of rain and storm. Gilgamesh, the sun, conquered these.

See the sun himself! on wings
 Of glory up the east he springs.
 Angel of light! who from the time
 Those heavens began their march sublime,
 Hath first of all the starry choir
 Trod in His Maker's steps of fire! ²⁹

"On many seal cylinders and on the monuments Gilgamesh is pictured in the act of fighting with or strangling a lion. In the preserved portions of the epic no reference

²⁷ "Religion of Babylonia and Assyria," ch. xxiii, p. 482.

²⁸ *Ibid.*, p. 483. ²⁹ Lalla Rookh.

to this contest has been found." * * * "After escaping from the danger occasioned by the lions, Gilgamesh comes to the mountain Mashu, which is described as a place of terrors, the entrance to which is guarded by 'scorpion-men.'"

He reached the mountain Mashu,
Whose exit is daily guarded,
Whose back extends to the dam of heaven.³⁰

It will be recalled that the cloud-belt is pictured by the Babylonians as a mountain. The description of Mashu is dependent upon this conception. Ragozin says of the 'scorpion-men' they were "gigantic monstrous beings, half men, half scorpions: their feet were below the earth, while their heads touched the gates of heaven; they were the wardens of the sun."³¹

They were the Pillars of Hercules. In the Greek, Hercules strangles the serpents sent to destroy him in the cradle. In the Hebrew it is the *house of the Philistines*, whose pillars Samson—Shemesh, the Sun—destroyed and thereby slew his enemies. In fact, there is no end to the figures under which canopy darkness is represented in the myths and legends of the world. Often it is a sphinx, a dragon, or a witch. In the Egyptian symbolism it is a scorpion, conceived as stinging the sun to death, and after that sitting as guard over it. The same appears to have been the conception in the Akkadian myth of 'scorpion-men' which we have just perused. "At the appearing of the sun, and the disappearing of the sun, they guard the sun."³² Plainly they stand at the imaginary boundary between firm land and the watery region of the upper world. In the epic (60, 9) one version reads that the "Scorpion man and his wife guard the gate leading to the great cloud mountain, Mashu." As they watched the sun rise and set in the slit

³⁰ *Ibid.*, pp. 488, 489. ³¹ "Story of Chaldea," ch. vii, p. 311.

³² Substance of the above culled from Charles De B. Mills' "The Tree of Mythology," p. 162.

between them, *i.e.*, between the two pillars, verily they were its guardians. Their upper part, as the text says, reaches to the sky, and their irtu (breast?) to the lower regions. This lower or hidden part, which seemed to the ancients to go down below the horizon, was the scorpion part.

The scorpion-men bring us back to the story of Ea, for Gilgamesh was on his way to find Parnapishtim when he came across these strange beings. Parnapishtim was the Noah of the epic, though in some of the details he bears a closer resemblance to Lot than to the patriarch of the deluge.

Gilgamesh speaks to Sabitum:

"(Now) Sabitum, which is the way to Parnapishtim?

If it is possible, let me cross the ocean.

If it is not possible, let me stretch myself on the ground."

Sabitum speaks to Gilgamesh:

"O Gilgamesh! there has never been a ferry,

And no one has ever crossed the ocean.

Shamash, the hero, has crossed it, but except Shamash, who can cross it?

Difficult is the passage, very difficult the path.

Impassable (?) the waters of death that are guarded by a bolt.

How canst thou, O Gilgamesh, traverse the ocean?

And after thou hast crossed the waters of death, what wilt thou do?"³³

As we have not yet become acquainted with Shamash, a digression from the epic will be in order, so that we may come to know the sun and moon gods. Shamash was the original or older Sun-god and it is a significant fact of the early Babylonian or Sumerian religion, that his cult was subordinate to the worship of Sin, the Moon-god. Indeed, according to one tradition, Shamash was regarded as the son of the Moon-god, and verily this tradition is founded on fact, for it will be remembered that it was an actual necessity of nature that caused the sun first to be seen in the vapor arch or moon where he was born, as it were, in the water and out of the water. Sin was originally the moon-like arch, but later he is represented on some of the tablets accompanied by

³³ Jastrow, "Religion of Babylonia and Assyria," ch. xxiii, pp. 490-491.

the lunar disk.³⁴ Undoubtedly this was a later development of the cult. In the beginning Sin was the vapor-arc, simply a crescent arc. After the deluge, when the gods fled to the clear vault of heaven, Sin naturally became identified again with the only crescent form in the clear sky, the new moon.

Nannar means 'the illuminator'; it is one of the names of Sin. The following extracts from the moon hymn illustrate the conceptions current about this deity:

Father Nannar, moon-god, chief of the gods.

Father Nannar, lord of the brilliant crescent, chief of the gods.

O strong bull, great of horns, perfect in form, with long flowing beard of the color of lapis-lazuli.

Powerful one, self-created, a product (?) beautiful to look upon, whose fulness has not yet been brought forth.

Father, begetter of the gods and of men, establishing dwellings and granting gifts.³⁵

The statement that the gods were born of the moon stamps it as the beginning place of the sky-scenes, the canopy. When the moon came to be conceived as a female divinity, Ishtar became also the goddess of the moon. This 'shiner' or moon was likewise the sun of the ancients.

The winged sun of Assyria is one of the most familiar emblems in the architectural adornment of the east. The attribute of flight indicates that the original sun was the 'shiner,' the swift moving canopy itself. Another statement that proves that the sun was originally the canopy is that Ninib—the major solar deity—swallowed up Nin-girsu, Nin-gish-zidu, another solar deity, and Nin-shakh. Nin-shaka-kuddu was 'the mistress of Uruk,' 'the lady of shining waters.' But to return to the epic of Gilgamesh:

Ea warned Parnapishtim of the approach of the flood. Now, Ea lived in the sky-stream above, and no doubt the aspect of the stream conveyed the warning.

³⁴ Notably on the cylinder-seal No. 89126, British Museum.

³⁵ Jastrow, "Religion of Babylonia and Assyria," ch. xvii, p. 303.

Doomed to destruction 'neath the dank dark cloud with nothing to indemnify—

The earth was doomed 'neath the great black thing which hung in the parted sky.

Parnapishtim told the story to Gilgamesh as follows:

Parnapishtim spoke to Gilgamesh:

"I will tell thee, Gilgamesh, the marvelous story,
And the decision of the gods I will tell thee.
The city Shurippak, a city which, as thou knowest,
Lies on the Euphrates,
That city was corrupt, so that the gods thereof
Decided to bring a rainstorm upon it.
All of the great gods, Anu, their father;
Their counsellor, the warrior Bel;
The bearer of destruction, Ninib;
Their leader, En-nugi;
The lord of unsearchable wisdom, Ea, was with them,
To proclaim their resolve to the reed-huts.
'Reed-hut, reed-hut, clay structures, clay structures,
Reed-hut, hear! Clay structure, give ear!'

* * * * *

O man of Shurippak, son of Kidin-Marduk!
Erect a structure, build a ship."

"Parnapishtim declares his readiness to obey the orders of Ea, but, like Moses upon receiving the command of Yahwe, he asks what he should say when people questioned him.

"What shall I answer the city, the people, and the elders?"

Ea replies:

"Thus answer and speak to them:

'Bel has cast me out in his hatred,
So that I can no longer dwell in your city.
On Bel's territory I dare no longer show my face;
Therefore, I go to the "deep" to dwell with Ea, my lord.

* * * * *

Over you a rainstorm will come,
Men, birds, and beasts will perish.

* * * * *

When Shamash will bring on the time, then the lord of the whirlstorm
Will cause destruction to rain upon you in the evening."

Parnapishtim now proceeds to take his family and chattels on board.

"All that I had, I loaded on the ship.
With all the silver that I had, I loaded it,
With all the gold that I had, I loaded it,
With living creatures of all kinds I loaded it.
I brought on board my whole family and household,
Cattle of the field, beasts of the field, workmen—all this I took on board."

Parnapishtim is ready to enter the ship, but he waits until the time fixed for the storm arrives.

"When the time came
For the lord of the whirlstorm to rain down destruction,
I gazed on the earth;
I was terrified at its sight,
I entered the ship, and closed the door.
To the captain of the ship, to Puzur-Shadurabu,³⁰ the sailor,
I entrusted the structure with all its contents.

* * * * *

Upon the first appearance of dawn
There arose from the horizon dark clouds,
Within which Ramman caused his thunder to resound.
Nabu and Sharru marched at the front.
The destroyers passed across mountains and land.
Dibbarra lets loose the (mischievous forces?),
Ninib advances in furious hostility.
The Anunnaki raise torches
Whose sheen illumines the universe,
As Ramman's whirlwind sweeps the heavens,
And all light is changed to darkness.

* * * * *

Brother does not look after brother,
Men care not for another. In the heavens,
Even the gods are terrified at the storm.
They take refuge in the heaven of Anu.
The gods cowered like dogs at the edge of the heavens."

The significance of this language is remarkable: the gods

³⁰ "Puzur" signifies "hidden," "protected." "Shadu rabu," i.e., "great mountain," is a title of Bel.

had to cower on the edge of heaven because the canopy which had been their home had passed away.

"Ishtar groans like a women in throes,
The lofty goddess cries with loud voice,
The world of old has become a mass of clay.

* * * * *

That I should have assented to this evil among the gods!
That when I assented to this evil,
I was for the destruction of my own creatures!
What I created, where is it?
Like so many fish, it fills the sea."⁸⁷

⁸⁷ Jastrow, "Religion of Babylonia and Assyria," ch. xxiii, p. 495 ff.

CHAPTER XVI

EGYPTIAN MYTHS

IN Egypt, the dead grave-yard of the past, the present hypothesis finds a living record which begins with the memorials of the old sky scenes, followed by the introduction of pure and simple sun worship (disk-worship) in the eighteenth dynasty.¹ This change of cult was too radical, however, for the people of that day, so they reverted to their old gods, whose memory was probably still kept before them by lingering remnants of the dethroned system.²

The critical or turning event in this history is the change of cult to disk-worship. In Assyria we have the winged disk, emblem of Ashur. The interpretation of which is that the head of the Assyrian pantheon was some phase of the personified sun. Frequently a tail was attached to the

¹ In the twentieth dynasty (1100 B.C.) a series of star tables have been found recorded in several manuscripts recovered from the tombs.

² It is said of Solon the Greek law-giver, that when he visited Egypt, six hundred years before Christ, he had a talk with the priests of Sais about the Deluge of Deucalion. The following is Plato's account: "Thereupon, one of the priests, who was of very great age, said, 'O Solon, Solon, you Hellenes are but children, and there is never an old man who is an Hellene.' Solon, hearing this, said, 'What do you mean?' 'I mean to say,' he replied, 'that in mind you are all young; there is no old opinion handed down among you by ancient tradition, nor any science which is hoary with age. And I will tell you the reason of this: there have been, and there will be again, many destructions of mankind arising out of many causes. There is a story which even you have preserved, that once upon a time Phaëton, the son of Helios, having yoked the steeds in his father's chariot, because he was not able to drive them in the path of his father, burnt up all that was upon the earth and was himself destroyed by a thunderbolt. Now, this has the form of a myth, but really signifies a declination of the bodies moving around the earth and in the heavens, and a great conflagration of things upon the earth recurring at long intervals of time.'" *Dialogues*, xi, 517, Timæus.

wings, the meaning of which was that the bird or sun was seen moving over the canopy.

This same symbol, without the tail, strikingly resembles the Egyptian emblem; the wings of the latter, however, are those of the sparrow-hawk, their sacred bird. As time passed on, the wings were dropped. The sun came clearer and clearer into view, until finally the vapor appendages dissipated forever; naturally the symbolic representations were altered in order to conform to the new conditions, hence the wings were dropped.

Rawlinson says: "Aten, in Egyptian theology, had hitherto represented a particular aspect or character of Ra, 'the sun'—that aspect which is expressed by the phrase, 'the solar disk.' How it was possible to keep Aten distinct from the other sun-gods, Ra, Khepra, Tum, Shu, Mentu, Osiris, and Horus or Harmachis, is a puzzle to moderns; but it seems to have been a difficulty practically overcome by the Egyptians, to whom it did not perhaps even present itself as a difficulty at all. Disk-worship consisted then, primarily, in an undue exaltation of this god, who was made to take the place of Ammon-Ra in the Pantheon, and was ordinarily represented by a circle with rays proceeding from it, the rays mostly terminating in hands, which frequently presented the symbols of life and health and strength to the worshiper."³

From the viewpoint of the present hypothesis the difficulty which Rawlinson mentions relative to the fact that the ancients kept distinct the various aspects of the sun, naming them as different gods, fizzles away. We moderns cannot find enough phases in the existing sun to go around amongst the gods. Had we lived under the canopy skies, everything would have been different; for instance, Ammon or Amen means 'concealer,' and this god is often coupled with another as Amen-Ra, the solar deity covered.⁴

³ "The story of Ancient Egypt," ch. xiv, p. 224.

⁴ E. A. Wallis Budge, "The Dwellers on the Nile," 4th ed., p. 142.

‘Aten’ is probably the same as ‘Adon,’ the root of Adonis; thus we see how the Greeks also worshiped this feature of the glorious sun, but their story has mellowed with age. Adonis was a youth who died from a wound received from a boar during the chase—plainly the youthful sun was swallowed up by the remnant of a floating vapor-form. Originally he was six months behind the canopy and six months in the open space. Later the worship of Adonis appears to have had reference to the death of nature in winter and to its revival in spring, hence Adonis spent six months in the lower world and six months in the upper.

But to return to Egypt: “In the matter of religion,” says Rawlinson, “the most noticeable changes which occurred are connected with the disk-worship, with the alternate elevation and depression of the god Set. The cult of the disk, favored by Amenôphis III, and fully established by his son, Amenôphis IV, or Khuenaten, is chiefly remarkable on account of its exclusive character, the disk-worshippers opposing and disallowing all other cults and religious usages. Had Khuenaten been able to effect the religious revolution at which he aimed, the old Egyptian religion would have been destroyed, and its place would have been taken by a species of monotheism, in which the material Sun would have been recognized as the One and only Lord, and Ruler of the Universe. Ammon, Khem, Kneph, Phthah, Maut, Khonsu, Osiris, Horus, Isis, Thoth would have disappeared, and the sun-worship, pure and simple, would have replaced the old complicated polytheism. But Egypt was not prepared for this change.”⁵

Egypt was not ready to overturn her gods, so let us look behind the doors of the vapor belt, at the scenes which impressed themselves so strongly on their minds as to cause them to believe that they saw into the chambers of higher

⁵ “History of Ancient Egypt,” vol. ii, ch. xxi, p. 188.

beings than themselves. Their eyes revealed to them the 'Hall of the Two Truths' (*i.e.*, the Pillars of Hercules), the double abode of the sun in the heavens, through which, according to the teachings of their theology, their dead had to pass and where they themselves would have to stand in judgment before Osiris, the sun-god, 'Lord of Life,' before they could enter to the fields of eternity beyond.

It is recorded of Osiris that in the Hall of Two Truths he sat beneath a canopy. When he disappeared behind it he was 'lost' and all Egypt mourned for him. When he returned he was said to be 'found,' and then all Egypt rejoiced. The myth of 'Osiris Lost,' when all Egypt mourned, represents the annual journey of the sun behind the northern or falling cloud bank. The important point is that the myth does not deal with the daily conflict between day and night, but in its full expansion it covers the whole year. The echo of this event sounded down through the ages long afterwards. Rawlinson says:

"Other feasts were held in honor of Osiris on the seventeenth day of Athyr and the nineteenth of Pashons; in the former of which the 'loss of Osiris,' and in the latter his recovery, were commemorated. A cow, emblematic of Isis, was veiled in black and led about for four successive days, accompanied by a crowd of men and women, who beat their breasts in memory of the supposed disappearance of Osiris from earth and his sister's search for him; while, in memory of his recovery, a procession was made to the seaside, the priests carrying a sacred chest, and, an image or emblem of Osiris fashioned out of earth and water having been placed in it, the declaration was made, 'Osiris is found! Osiris is found!' amid general festivity and rejoicing."⁶

The Abbé Brasseur de Bourbourg gives a legend from the Quiche Indians of Central America which depicts this same scene: "Now, behold, our ancients and our fathers were

⁶ "History of Ancient Egypt," vol. i, ch. x, p. 199.

made lords, and had their dawn. Behold, we will relate also the rising of the sun, the moon, and the stars! Great was their joy when they saw the morning-star, which came out first, with its resplendent face before the sun. At last the sun itself began to come forth; the animals, small and great, were in joy; they rose from the water-courses and ravines, and stood on the mountain-tops, with their heads toward where the sun was coming. An innumerable crowd of people were there, and the dawn cast light on all these people at once. At last the face of the ground was dried by the sun; like a man the sun showed himself, and his presence warmed and dried the surface of the ground. Before the sun appeared, muddy and wet was the surface of the ground, and it was before the sun appeared, and then only the sun rose like a man. But his heat had no strength, and he did but show himself when he rose; he only remained like a mirror; and it is not, indeed, the same sun that appears now, they say, in the stories.”⁷

The death of Osiris has many like parallels in ancient thought. Both annular, and also astronomical. For instance, Epictetus favors the opinion that at the solstices of the great year not only all human beings, but even the gods, are annihilated, and speculates whether at such time Jove feels lonely.⁸ The bank behind which Osiris disappeared was one of the Halls of Two Truths, to which the deceased were directed by the ‘Ritual, or Book of the Dead.’

A passage in this book which contains instructions for the deceased reads: “Retreat unto the eastern heavens. Unto the dwellings which support the mount. That great mysterious mountain that spreads light among the gods.” The reason for this direction to the dead was probably due to the fact that the cloud-mountain in its daily revolution kept ever turning towards the east. In the third part of the

⁷ Tylor, “Early History of Mankind,” p. 308.

⁸ “Discourses,” book iii, ch. xiii.

Ritual, the deceased in company with the sun himself traverse the various houses of heaven. In the cosmologies of the ancients these great black halls or chambers (hiding places) are associated with the abode of the damned and lost souls. In the Homeric conception, they are called Hades and Tartarus. It is not credible, as some scholars would have it, that the early Greeks, unschooled in the exercise of the scientific imagination and unacquainted with Newton's law of gravitation, could have pictured a pendent under-surface of the earth, around which flopped topsy-turvy ghosts, and also that infernal rivers and infernal palaces could have clung to this under-hemisphere.

The myth of Osiris and his consort Isis, whose image is crowned with the sun disk, is as follows:

"Osiris and Isis were at one time induced to descend to the earth to bestow gifts and blessings on its inhabitants. Isis showed them first the use of wheat and barley, and Osiris made the instruments of agriculture and taught men the use of them, as well as how to harness the ox to the plough. He then gave men laws, the institution of marriage, a civil organization, and taught them how to worship the gods. After he had thus made the valley of the Nile a happy country, he assembled a host with which he went to bestow his blessing upon the rest of the world. He conquered the nations everywhere only with music and eloquence. His brother Typhon saw this, and sought during his absence to usurp his throne. But Isis, who held the reins of government, frustrated his plans. Still more embittered, he now resolved to kill his brother. Having organized a conspiracy of seventy-two members, he went with them to the feast which was celebrated in honor of the king's return. He then caused a box or chest to be brought in, which had been made to fit exactly the size of Osiris, and declared that he would give that chest of precious wood to whosoever could get into it. The rest tried in vain, but no sooner was Osiris in it than

Typhon and his companions closed the lid and flung the chest into the Nile. When Isis heard of the cruel murder she wept and mourned; and then, with her hair shorn, clothed in black, and beating her breast, she sought diligently for the body of her husband. In this search she was materially assisted by Anubis, the son of Osiris and Nephthys. They sought in vain for some time; for when the chest, carried by the waves to the shores of Byblos, had become entangled in the reeds that grew at the edge of the water, the divine power that dwelt in the body of Osiris imparted such strength to the shrub that it grew into a mighty tree, enclosing in its trunk the coffin of the god. This tree, with its sacred deposit, was shortly after felled, and erected as a column in the palace of the king of Phœnicia. But at length, by the aid of Anubis and the sacred birds, Isis ascertained these facts, and then went to the royal city. There she offered herself at the palace as a servant, and, being admitted, threw off her disguise and appeared as the goddess, surrounded with thunder and lightning. Striking the column with her wand, she caused it to split open and give up the sacred coffin.”⁹

Interpreted, this means that sunlight brought gifts to man in the shape of agricultural plenty. Then an enemy called Typhon, the personified canopy, trapped him in his folds or coffin. Typhon’s name is the same as the Hebrew word for north, ‘Tsaphon.’ He stretched out the canopy we read across the empty space in the north sky (Job xxvi: 7). The pillars of heaven trembled (verse 11), and the heavens were garnished by the crooked serpent (verse 13). Apophis was the Egyptian serpent of darkness. “He is portrayed,” says Rawlinson, “either as a huge serpent disposed in many folds, or as a water-snake with a human head. He was supposed to have sided with Set against Osiris, and to have thereby provoked the anger of Horus, who is frequently rep-

⁹ “Bulfinch’s Age of Fable,” Revised edit. of Rev. J. Loughran Scott, pp. 369–370.

resented as piercing his head with a spear.”¹⁰ He is a sky-scene that seems to have impeded the progress of souls on their journey to the ‘Hall of Two Truths.’ Subsequently he gave way, in the mythic system, to Set or Typhon, which is logical, as he was practically the same personified natural phenomenon. F. De Lanoye says:

“In the Egyptian mythology, Apophis, the serpent, is the great enemy of the Sun; in several hypogees he is represented as struggling against the gods of the Amenti, who succeed in capturing and chaining him.”¹¹

Typhon and the companions who were with him, after they had trapped the sun, closed the lid of the chest and flung him into a river which the myth designates as the Nile, but which older sources clearly indicates was heaven’s river. The tree in which the coffin became incased is the same as Ygdrasil, the world tree of the Scandinavians. This great ash is supposed to have supported the whole universe, but suffice it for the present, with lightning and thunder, the goddess of sunlight made the mighty column or tree to split open and surrender the sun himself. Horus, the new sun god, is said to have despatched Typhon with a sun-dart, which pierced his watery head through and through. This again is nothing but the tale of Apophis.

Many details of this wonderful myth could be dwelt on. Thus in the Isle of Philæ, in the temple dedicated to Osiris and his wife and their son Horus, sculptured on the walls is a complete record of this legend. The last shrine represents Osiris rising from a couch which is supported by two legs and is arched just like the body of Nu-t. It could not be more suggestive of the sun resting on the arched canopy. It is depicted as it appeared to the Egyptians.

¹⁰ “History of Ancient Egypt,” vol. i, ch. x, p. 186.

¹¹ “Wonders of Art and Archæology in Egypt 3300 Years Ago,” p. 146. See “Champollion’s Letters from Egypt.”

Typhon, or Set, as he is often called,¹² like all the personifications of the canopy, was at first a good deity. He afterwards became the principle of evil, and, rapidly running down the scale, he finally became the very synonym of death itself. Set or Seb was the son of Ra, the ancient sun. This luminary was nothing but the shiner or canopy. So, also, the ancient moon was not our present satellite, but only a crescent form of the ring. The mutilation of the sun's body by Typhon is one of many similar descriptions found elsewhere. The earth was covered with sun-fragments every time a canopy broke up its light.

The Ute philosopher has strangely mixed the matter of the mutilation of this old sun or shining canopy with the occasional disappearance of the sun itself. Ta-vi, the sun-god, must have originally been the blazing canopy, and then like Osiris he became the true sun. The legend is as follows:

"In that long ago, the time to which all mythology refers, the sun roamed the earth at will. When he came too near with his fierce heat the people were scorched, and when he hid away in his cave for a long time, too idle to come forth, the night was long and the earth cold. Once upon a time Ta-wats, the hare-god, was sitting with his family by the camp-fire in the solemn woods, anxiously waiting for the return of Ta-vi, the wayward sun-god. Wearied with long watching, the hare-god fell asleep, and the sun-god came so near that he scorched the naked shoulder of Ta-wats. Foreseeing the vengeance which would be thus provoked, he fled back to his cave beneath the earth. Ta-wats awoke in great anger, and speedily determined to go and fight the sun-god. After a long journey of many adventures, the hare-god came to the brink of the earth, and there watched long and

¹² Egyptologists admit that Set, Sit, Typhon, Bes, and Sutekh are identical. To this list possibly Ombo and Nubi should be added. Apophis also was a form of Typhon. Sutekh was a god of the Canaanites. Maspero, "*Histoire Ancienne*," p. 165.

patiently, till at last, the sun-god coming out, he shot an arrow at his face, but the fierce heat consumed the arrow ere it had finished its intended course; then another arrow was sped, but that also was consumed; and another, and still another, till only one remained in his quiver. But this was the magical arrow that had never failed its mark. Ta-wats, holding it in his hand, lifted the barb to his eye and baptized it in a divine tear; then the arrow was sped and struck the sun-god full in the face, and the sun was shivered into a thousand fragments, which fell to the earth, causing a general conflagration. Then Ta-wats, the hare-god, fled before the destruction he had wrought, and as he fled the burning earth consumed his feet, consumed his legs, consumed his body, consumed his hands and his arms—all were consumed but the head alone, which bowled across valleys and over mountains, fleeing destruction from the burning earth, until at last, swollen with heat, the eyes of the god burst and the tears gushed forth in a flood which spread over the earth and extinguished the fire. The sun-god was now conquered, and he appeared before a council of the gods to await sentence. In that long council were established the days and nights, the seasons and the years, with the length thereof, and the sun was condemned to travel across the firmament by the same trail day after day till the end of time.”¹³

The Greeks have portrayed certain features of this tale in the legend of Phaëton. This god was a son of Sol. Anxious to display his skill in horsemanship, he was allowed to drive the chariot of his father for one day. The horses of the sun soon found out the incapacity of the charioteer, became unmanageable, and overturned the chariot. There was such fear of injury to heaven and earth, that Jove, to stop the destruction, killed Phaëton with a thunderbolt.

“Even the ruler of vast Olympus, who hurls the ruthless

¹³ “*Popular Science Monthly*,” October, 1879, p. 799.

bolts with his terrific right hand, cannot guide this chariot; and yet what have we greater than Jupiter? The first part of the road is steep, and such as the horses, though fresh in the morning, can hardly climb. In the middle of the heaven it is high aloft, whence it is often a source of fear, even to myself, to look down upon the sea and the earth, and my breast trembles with fearful apprehensions. The last stage is a steep descent, and requires a sure command of the horses. * * * Besides, the heavens are carried round with a constant rotation, and carry with them the lofty stars, and whirl them with rapid revolution. Against this I have to contend; and that force which overcomes all other things does not overcome me, and I am carried in a contrary direction to the rapid world.”¹⁴

Be it noted that Ovid supposes the rapid world-cloud to move or revolve in one direction, while the sun appears to move in the other. William F. Warren is authority for the following:

“Now, it is difficult to believe it a mere accident that in various ancient authors we find allusion both to an extremely ancient displacement of the sky and its supposed original state. None of these allusions have ever been explained by writers on the subject. One of them occurs in Plato’s *Timæus*, where, in language ascribed to an Egyptian priest of Solon’s time, ‘a declination of the bodies revolving round the earth’ is spoken of, and this declination is offered as the true explanation of the partial destruction of the world commemorated in the myth of *Phæton*. As this destruction was by fire, there would at first sight seem to be no connection between it and the destruction at the time of the Deluge; nor is there in the context anything to suggest such a connection. Fortunately, however, we have in *Hyginus* a fuller version of the myth, from which it appears that the Greeks

¹⁴ Ovid, “*The Metamorphoses*,” book xi, fable 1.

supposed Deucalion's universal flood to have been providentially sent to extinguish the fearful conflagration which Phaëton's unskilful driving of the steeds of the sun had occasioned. This makes the connection clear and direct. The Flood and the 'declination of the heavenly bodies revolving round the earth' are at once brought into a true historic relation.

"In like manner, in the Bundahish, in the first five chapters, and in the Zâd Sparam's paraphrase of the same, it is stated that during the first three thousand years, before the incoming of the Evil One, 'the sun, moon, and stars stood still,' but as soon as the Destroyer of the good creation came he assaulted and deranged the sky, as well as the earth and sea. And, remarkably enough, it is stated that as a result of this assault the Evil One mastered as much as '*one third of the sky*' and overspread it with darkness. Moreover, in the thirtieth chapter, in giving a prophetic account to the final restoration of the material world to its primeval state, there seems to be an allusion in verse thirty-two to a necessary resetting or readjustment of the celestial vault by the hand of its Creator."¹⁵

The sum and substance of this matter is that the winged sun was worshiped practically everywhere. F. Max Müller says in the Second Series of Auld Lang Syne: "One of the most intelligible names given to the sun was Asva, the racer, or Dadhikrâvan or Vâgin, horse. And while at one time the sun was a racer, at another the sun was conceived as approaching men and standing on a golden chariot which was drawn by horses, as in Greek mythology. Thus we read, Rig-Veda i, 35, 2: 'The god Savitrî (the sun), approaching on the dark-blue sky, sustaining mortals and immortals, comes on his golden chariot, beholding all the worlds.'" To us this quotation from the Veda is a description of the

¹⁵ "Paradise Found," pp. 195-196; West, "Pahlavi Texts," pt. i, p. 129.

solar orb shining through the dark-blue vault, the abode of gods and demigods. Müller catches the echo from the older thought, which called the shining canopy the sun or racer. Both Hesiod and Homer testify that the solar-car was drawn by winged steeds. The Hindus say that their sun was endowed with horses that were very fast. The people of the olden times saw these flying steeds, such as Pegasus, and so came to worship the swift or winged one (sometimes plural), praising heaven for their wondrous deeds. The wings attached to the glowing golden sun of Assyria and Egypt were for rapid flight. In North America the sun was called a hare; afterwards, as the swift became slow, the lame hare became the sun emblem. Rapid suns or horses were flying canopies and were also called chariots; when they reflected the sunlight they appeared to be on fire. So Phœbus lashed his steeds of fire and rushed upon the very wings of the wind. Again, Phaëton drove the coursers of the sun, but as he drove them a fearful change seemed to be impending. The atmosphere became sultry and almost unbearable as a result of the settling down of the sweltering vapor belt. This made the world below seem as though it were lost in fire. The lowering heavens also caught a fire-glow from the true sun, and heaven and earth appeared to be in one blaze. The Storm-King, roused by these conditions, brought to his aid Jove the 'Thunderer,' who hurled his bolts at the luckless Phaëton, and the whole war of the vapors was fought o'er again:

Then headlong falling, with his hair on fire,
Poor Phaëton marked the heavens as a star.

It is further recorded that all the gods were frightened, and that the rivers shrank. All the world felt that a change was coming. Yet through this terror wisdom was brought down to man, the Delphic oracle had spoken, and in the sight of all the end was evidently near at hand, for though Apollo, Phaëton's own father, regained possession of his steeds and

by accelerating the speed¹⁶ seemed to be driving the chariot of the sun along its proper course, yet, as we have said, it was only for a time. The Delphic oracle had spoken.

These remarks on the slowing up of the speed with which the canopy revolved brings to our attention once more Typhon, the Egyptian canopy. Typhon personified was also a character in Grecian mythology. He and Echidna, who

¹⁶ The substance of the ring-belt possessed energy on account of its situation, for the attraction of the earth was capable of doing work. The further the ring-belt was from the earth the larger was the quantity of energy that it possessed from this cause. But it also possessed another kind of energy, which was due to its velocity. The further the ring was from the earth the smaller was this velocity and the smaller was the quantity of energy possessed from this cause. If we unite the two forces we find that the result may be expressed in the following manner: When the ring-belt revolved round the earth the total energy of the system when added to the reciprocal of the distance between the two bodies measured by a proper unit of length was the same for all distances between them. This shows the connection between the energy and the distance. Thus we see that when the orbit of the ring-belt decreased, the energy of the system decreased also. The moment of momentum of any such system is proportional to the square root of the distance of the two bodies. When the distance between the ring and the earth lessened the moment of momentum remained constant. In other words, the more the system contracted the faster it revolved. This acceleration was the result of what is known to us as the law of the conservation of moment of momentum.

"The apparent anomaly of accounting for an accelerative effect by a retarding cause disappears when it is considered that any check to the motion of bodies revolving round a centre of attraction causes them to draw closer to it, thus shortening their periods and quickening their circulation." Agnes M. Clerke, "History of Astronomy During the Nineteenth Century," 3d ed., pp. 115-116.

The late James E. Keeler, Director of the Lick Observatory, proved by his observations with the spectroscope in 1895, that Saturn's rings rotate. According to the undulatory theory, light consists of a series of waves; the spectroscope enables us to measure and count these, and if we find on counting them that there are too many, we know that the source from which the light comes is approaching, but on the other hand, if the number is too few, then we know that it is receding. Keeler proved that one side of Saturn's rings were approaching and the other receding. He also proved that the inner edge of each ring rotates faster than the outer.

was half a maid and half a serpent, and withal a bloodthirsty wench, had a child, the Sphinx, who was also half woman and half lion, mild yet fierce. The Grecian beast, unlike the Egyptian Sphinx, had wings. This shows that it was a flying canopy. The Thebans suffered in its dreadful maw and asked the question, Will it ever die? They saw a change coming over it, hence it seemed a riddle. What would be the end? The mild conditions were passing away. Œdipus, or swollen-foot, the whirling cloud-belt, was seen to drop and go slower and slower. As youth needs another prop in old age, so the canopy needed something. Longevity, which had been man's portion under the greenhouse roof, now ended, and the ancients said the cause was that the Sphinx, or canopy, had cast herself upon a rock. Œdipus thus killed his father; that is, he stopped the upper or revolving ring; also his mother and his wife, who were also sky-forms.

Tragic as this ending was, the story is full of beautiful vapor-belt canopy lore. For instance, in his old age, Œdipus was comforted by the presence of his daughter, Antigone, she who was born opposite, the pale light that appears over against the darkening canopy gone blind. His sons are said to have disputed for the throne of Thebes, which was originally a walled city of the canopy. Undoubtedly the Egyptian and Grecian cities were named for it.¹⁷ Seven heroes warred

¹⁷ Nothing can be plainer than that the names attached to regions and personified appearances in the sky were transferred by the ancients to terrestrial localities. For instance, to locate the original Olympus as a many-peaked earthly mountain would simply embarrass the imagination. How could the following vivid picture be explained?

O evil-minded Juno, full of guile!
 Thy arts have made the noble Hector leave
 The combat, and have forced his troops to flee.
 I know not whether 't were not well that thou
 Shouldst taste the fruit of thy pernicious wiles,
 Chastised by me with stripes. Dost thou forget
 When thou didst swing suspended, and I tied
 Two anvils to thy feet, and bound a chain

against its mighty gate, but the battle ended without their taking it. However, there soon after came a day when the great city fell and perished as all sky scenes had to in those strenuous days. The change arrived and slow-foot was the cause.

For the same reason that *Œdipus* was called swollen-foot, *Vulcan* was made lame, and as the canopy of vapor dissipated its fire went out; thus he also, as the story goes, fell from heaven.

The slowing of the speed of the canopy made it appear on earth that it was actually going backwards, which fact is recorded in many myths; thus it is said that *Cacus*, when he stole the oxen of *Geryon*, dragged them backward by their tails to his cave.

"*Achilles* was invulnerable in all parts save the heel. This hero seems indubitably to have been the solar deity, and, as in the case of *Baldur*, *Siegfried*, *Rustam*, etc., could be wounded only in one place. The heel here is symbolic, indicating that he is vulnerable only from behind. So *Baldur* falls struck by a dart from his blind brother *Hödur* (the darkness). *Siegfried* is wounded by *Hagene* (the thorn) in the spot between his shoulders where the broad linden leaf had stuck when he was bathing himself in the dragon's blood, by which he was made in all other points invulnerable.

"So in the *Algonquin* myth of the Summer-maker who had broken through the sky into the heaven-land beyond, and brought down to earth the warm winds, the birds, and the

Of gold that none could break around thy wrists?
Then didst thou hang in air amid the clouds,
And all the gods of high Olympus saw
With pity. They stood near, but none of them
Were able to release thee. Whoso came
Within my reach I seized, and hurled him o'er
Heaven's threshold, and he fell upon the earth
Scarce breathing.

Bryant's *Homer's Iliad*, bk. xv, 19 ff.

summer, it is said that, pursued by the dwellers in heaven, he was at last wounded by their arrows in his one vulnerable spot, viz., in the tip of the tail. The shining Manitu and Kwasind also could be wounded only in one place, in the scalp or the crown of the head.”¹⁸

Ovid tells us that a day was lost. The standing still of the sun (Joshua x) is a like reminiscence: the shiner actually did appear to stand still. It is significant that the record is accompanied by a description of the falling stones, for of necessity a canopy reaching this stage must begin to break up. This is the record:

“And it came to pass, as they fled from before Israel, and were in the going down to Beth-horon, that the Lord cast down great stones from heaven upon them unto Azekah, and they died: they were more which died with hailstones than they whom the children of Israel slew with the sword. * * *

“And the sun stood still, and the moon stayed, until the people had avenged themselves upon their enemies. Is not this written in the book of Jasher? So the sun stood still in the midst of heaven, and hasted not to go down about a whole day.

“And there was no day like that before it or after it.”¹⁹ Jasher was probably another Zeus; a great dim memory of a terrible time was no doubt bound up in this lost volume. Another account of falling material is found in Deut. xxviii: 23-24, 29, as follows:

“Thy heaven that is over thy head shall be brass, and the earth that is under thee shall be iron. The Lord shall make the rain of thy land powder and dust: from heaven shall it come down upon thee, until thou be destroyed. * * * And thou shalt grope at noonday, as the blind gropeth in darkness.”

¹⁸ Charles De B. Mills, “The Tree of Mythology,” p. 55.

¹⁹ Joshua x:11, 12, 14.

We have now seen that the hope of the Egyptians was stayed upon 'Osiris Found.' When he was dead Typhon ruled the sky, and the Grecian myth has shown us that his child was the Sphinx.

Yea, Egypt is the grave-yard of the past,
And here's the Sphinx with his cold stony lips
Touched by the finger of Dame Silence, who
Rules o'er this land of ruin and of dust.

Plainly a sphinx-temple was a place wherein to worship the cold spirit of the falling vapor-sky. The great sphinx at Ghizeh faces to the east, as though to catch the first glimpse of the day:

In eagerness he gazes like to one
That's guessing of the future and expects
An end that's coming, and a new-born sun.
Her head a woman, for she was quite mild,
His tail a lion, for he turned out fierce
As nearer to the earth he flew in death.
And by him stands the three great pyramids,
Memorials of the day of stablished things—
The shadow of the turning earth upon.²⁰
A canopy which seemed forever fixed.
A cloudy mountain which received its light
At night-time from beneath; where dwell the shades;
From the dead sun, from the great under-world.
At midnight this division of the rays
By the earth's shadow cast a cone-like form,
A pyramid athwart the darkened sky.

"The Hellenic and Roman myths concerning the 'World-mountain' were numerous, but in later times not a little confused, as Ideler has learnedly shown. By some, as for example Aristotle, it was identified with the Caucasus, and it was asserted that its height was so prodigious that after sunset its head was illuminated a third part of the night, and again a third part before the rising of the sun in the morning. This identification explains the later legend, according to which, in order to prove his rightful lordship of the world,

²⁰ James i:17.

Alexander the Great plucked 'the shadowless lance' (the earth's axis) out of the topmost peak of the Taurus Mountains. More commonly the mount is called Atlas, or the Atlantic mountain. Proclus, quoting Heraclitus, says of it: 'Its magnitude is such that it touches the ether and casts a shadow of five thousand stadia in length. From the ninth hour of the day the sun is concealed by it, even to his perfect demersion under the earth.'²¹

This shadow-mountain, which only appeared at night, seemed to stand in the inverted heavens; to the right and left of its cone were two great wings of light, with their apexes downward.

"Draw me (the nocturnal sun), infernal ones! . . .

"Retreat towards the eastern heavens, towards the dwellings which support Sar, that mysterious mountain that spreads light among the gods (or, that I may spread light among the gods?), who receive me when I go forth from amongst you, from the retreat."

"To the inverted infernal mountain seem to apply the expressions in chapter one hundred and fifty of the 'Book of the Dead: '——'"

We have said that it is not likely that the ancients, unacquainted with Newton's law of gravitation, could have pictured a pendent under-surface to the earth, so it follows that the midnight appearance of the mountain is here referred to.

"Oh, the very tall Hill in Hades! The heaven rests upon it. There is a snake or dragon upon it: Sati is his name," etc. The presence of the snake and the fact that heaven rests on the Hill of Hades confirms our supposition that a world under the horizon was not dreamt of.

"In another chapter of the same book a place is spoken of as 'the inverted precinct, which place is Hades.'" As heaven, according to the text cited above, rests on Hades, the locality of this precinct is fixed in the inverted night-sky.

²¹ William F. Warren, "Paradise Found," pp. 135-136.

The translator of another text, called the 'Book of Hades,' describes a 'pendent mountain,' which can hardly be anything other than *Ap-en-to*, the inverted mountain of Hades.

On the other hand, the expression 'underworld' is continually used in the writings and lore of the ancients, so that beyond question the great inverted wings of light shining up from below gave the peoples of those days an inkling of a region lying beneath. Our contention is that this place is not the mythological abode of the shades. The following shows the confused notions relative these two regions, the night-mountain, Hades, and the true underworld.

"The god advancing in a reversed position" (in a certain New Zealand legend) "is the sun in the Underworld. The image exactly accords with an Egyptian scene of the sun passing through Hades, where we see the twelve gods of the earth, or the lower domain of night, marching towards a mountain turned upside down, and two typical personages are also turned upside down. This is an illustration of the passage of the sun through the Underworld. The reversed on the same monument are the dead. Thus the Osirified deceased, who had attained the second life, in the Ritual, says exultingly, 'I do not walk upon my head.' The dead, as the Akhu, are the spirits, and the Atua (of the New Zealand legend) is a spirit who comes walking upside down. Massey elsewhere states that the earth 'was considered flat by the first myth-makers,' who in his scheme appear to have been Egyptians."²² A flat world does not bring any support to those who believe Hades was located in the nether hemisphere. In the 'Ritual' the Osirified dead says, "I do not walk upon my head." Had a pendent world been dreamt of, everything would have been considered upside down.

In Genesis i:16 there are two great lights mentioned; the greater ruled the day and the lesser the night. Egyptian

²² *Ibid.*, pp. 124, 125, 126. "Records of the Past," vol. x, p. 88. "The Natural Genesis," London, 1883, vol. i, p. 529.

mythology is full of references to the night-time as a time of shade:

A weird a fearful time, those hours of night,
With spook-like spectres shivering in the sky,
The canopy a sheeted envelope,
Ghosts and hobgoblins drifting in mid-air,
The ka or double visiting the tomb.

The shadow, or dark mountain, seemed much higher at night, and as its mass seemed to rise out of the realm of shades, it was only a step for the ancients to associate it with the dead, hence when they made patterns of it, these pyramids or likenesses naturally became tombs. The chambers, built into them, wherein the withered mummies awaited the coming back of their ka, were simply imitations of the halls wherein the dead sun hid himself in the dismal mountain. We erect memorials in our graveyards to-day in the shape of broken columns or shafts, which signify to us a life cut short by death. The pyramids suggested to the ancients pretty much the same thought, hence they built them over the chambers of their dead.

The same rectangular arrangement of temples which prevailed in Egypt held also in Chaldea. They lifted their eyes to the mountain in the sky 'the Father of Countries,' and imagined it the abode of the gods, the future home of every great and good man, 'a land with a silver sky.' The story of the building of the tower of Babel is the story of an effort on the part of the people to get into this home, as it were, surreptitiously. In the New World there were similar tales. Donnelly says:

"There is also a clearly established legend which singularly resembles the Bible record of the Tower of Babel.

"Father Duran, in his MS. '*Historia Antiqua de la Nueva Espana*,' A. D. 1585, quotes from the lips of a native of Cholula, over one hundred years old, a version of the legend as to the building of the great pyramid of Cholula. It is as follows:

“In the beginning, before the light of the sun had been created, this land (Cholula) was in obscurity and darkness, and void of any created thing; all was a plain, without hill or elevation, encircled in every part by water, without trees or created thing; and immediately after the light and the sun arose in the east there appeared gigantic men of deformed stature and possessed the land, and, desiring to see the nativity of the sun, as well as his occident, proposed to go and seek them. Dividing themselves into two parties, some journeyed to the west and others toward the east; these travelled until the sea cut their road, whereupon they determined to return to the place from which they started, and, arriving at this place (Cholula), not finding the means of reaching the sun, enamoured of his light and beauty, they determined to build a tower so high that its summit should reach the sky. Having collected materials for the purpose, they found a very adhesive clay and bitumen, with which they speedily commenced to build the tower; and, having reared it to the greatest possible altitude, so that they say it reached to the sky, the Lord of the Heavens, enraged, said to the inhabitants of the sky, ‘Have you observed how they of the earth have built a high and haughty tower to mount hither, being enamoured of the light of the sun and his beauty? Come and confound them, because it is not right that they of the earth, living in the flesh, should mingle with us.’ Immediately the inhabitants of the sky sallied forth like flashes of lightning; they destroyed the edifice, and divided and scattered its builders to all parts of the earth.”²³

Another enigma of the pyramids is the fact that they are usually orientated roughly according to the cardinal points. However, when we consider the evidence that their builders naturally followed the design in the heavens, this result is logical.

²³ Ignatius Donnelly, “Atlantis,” 21st ed., pp. 200–201.

The fact that the four faces do not exactly conform to the cardinal points has been set down as bad management or neglect on the part of the builders, but when it is remembered that they built according to the pattern in the sky, and that they viewed this pattern from various angles and at various stages of its collapse, it will be seen that this accusation is unjust. The oldest of the pyramids, as shown by the texts, is located north of Abydos. It belonged to Sneferû and was erected in the Fourth Dynasty; the latest belonged to the princes of the Twelfth Dynasty.²⁴ The construction of these monuments was therefore a continuous work, lasting some thirteen or fourteen centuries. During this long period the orientation of the cloud-mountain, which was ever drifting northwards, must have varied considerable. Tombs known as mastabas, which conveyed the same idea as the pyramids, were built before the Fourth Dynasty. Their angle is 75° and the pyramid angle from 50° to 55° .

Piazza Smyth contended that the angles of the Great Pyramid of Cheops contain factors from which can be calculated the distance of the sun from our earth. Unwittingly, if the ancient builders built true to their model, this data has been handed down to us.

Another remarkable piece of testimony from this ancient pile at Ghizeh is found in the fact that if one should go down the entrance passageway and then turn around and look out he would find himself gazing into the northern sky, which was probably the only spot of the clear blue visible at the time of the erection of this great monument. Perhaps Alpha Draconis, which was then (2170 B. C.) the North Star, and which was a very distinguished feature of the polar-egg or opening, may have shone right down this passageway when

²⁴ G. Maspero, "Manual of Egyptian Archæology," trans. Amelia B. Edwards, 1895, p. 132, see also p. 140.

the pyramid was built. Be this as it may, this egg-shaped opening is recorded in the myths of nearly all the ancients. It is called by the Greeks "Isles of the Blessed."

The poets have mistaken the locality of this sky-hole, owing to the fact that they naturally associated it with the sunset glory. We say naturally, for after the fall of the canopy it was the only sky-scene that could be compared to the original ruddy isle of Erytheia, on which the bright oxen (clouds) of Geryon were pastured. It was the isle of the Hesperides, and the apples were the stars seen in its clear expanse. Job draws a distinction between 'The Island of the Innocent' and the other countries of the world (xxii: 30). Ovid draws one between 'The Earth' and the rest of the globe. Plainly the ancients had an idea that terra firma was in some way united with the canopy.

"On the western margin of the earth, by the stream of Ocean, lay a happy place named the E-lysi-an Plain, whither mortals favored by the gods were transported without tasting of death, to enjoy an immortality of bliss. This happy region was also called 'Fortunate Fields' and the 'Isles of the Blessed.' " ²⁵

They need not the moon in that land of delight,
 They need not the pale, pale star;
 The sun is bright, by day and night,
 Where the souls of the blessed are.
 They till not the ground, they plow not the wave,
 They labor not, never! oh, never!
 Not a tear do they shed, not a sigh do they heave;
 They are happy for ever and ever! ²⁶

Wherever pyramid worship is found, one or more of these features is in evidence. The teocalli of Cholula covers more than twice the ground-space of Cheops. It is orientated, and in a vast hollow chamber under the structure was found two skeletons. The Mexican pyramids at Cholula and at Tula are said to resemble marvelously certain Assyrian and Chal-

²⁵ Bulfinch, "Age of Fable," Scott, p. 3. ²⁶ Pindar.

dean temples.²⁷ One of these teocalli glorified Quetzalcoatl the good canopy who as a god was reputed to have made flowers grow profusely. Originally Mexicans offered fruits and flowers to him, but afterwards his nature changed, so to propitiate him they offered human sacrifices. Quetzalcoatl reminds the investigator of the prince of Tyrus, the covering cherub.

The Spaniards also found two pyramids at San Juan Teotihuacan, one of which was dedicated to the sun and the other to the moon, but evidence was found that an older cult had been superseded. In one of these a passageway terminated in two small pits or wells, showing that they were used as tombs. Nearby are many smaller mounds. The two great ones are orientated east and west.

The great pyramid mound of the Incas on the banks of the Moche River is 800 feet long and 150 feet high, and has preserved up to this time the secret of its erection. The Mound Builders have left similar relics in the North American Continent. In western Illinois, at about the centre of the river flats known as the American Bottom, are a number of mound-groups. Cahokia, a truncated pyramid, is the largest individual mound; it covers over fourteen acres, or more than is covered by the largest Egyptian Pyramid.

"The great mound at Seltzertown, Mississippi, is of such dimensions as almost to preclude the belief of its artificial origin. It is a truncated pyramid, about 600 feet long and 400 broad at its base, and covering nearly six acres of ground. It is placed very nearly in reference to the cardinal points, its greater length being east and west. Its height is forty feet, accessible by a graded way which leads to a platform of four acres on the summit. From this platform rise three conical mounds, one at each end and one in the centre. Both

²⁷ Prescott, "Conquest of Mexico," book iii, ch. vi. *Scientific American Supplement*, No. 645. Foster, "Prehistoric Races of the United States of America," 6th ed., p. 345.

of the extreme mounds are truncated, the westernmost rising to the height of forty feet, and the easternmost is somewhat less.”²⁸

Our author goes on to show that certain of these mounds were used as burial places. He says: “The temple-mounds were also used as sepulchres. In that at Seltzertown, Dr. Dickeson found ‘vast quantities of human skeletons,’ and Mr. Hill, the former owner of the Cahokia Mound, in sinking a well on its platform, encountered charcoal at the depth of twenty-five feet. The Grave Creek Mound, which is in the form of a truncated cone—the flattened area on top being fifty feet in diameter, and therefore coming under the classification of temple-mounds—was found to enclose two vaults originally constructed of wood, which contained human skeletons.”²⁹

“The Grave Creek Mound, twelve miles below Wheeling, in West Virginia, is the most notable of all those in the Ohio Valley.

“It is seventy feet in height by nine hundred in circumference, and is destitute of lines of circumvallation. In 1838 Mr. A. B. Tomlinson, the owner of the premises, carried a drift along the original surface of the ground to the centre of the mound, and sank a shaft from the summit to intercept it. ‘At the distance of one hundred and eleven feet,’ he states, in a pamphlet published after the completion of the exploration, ‘we came to a vault, which had been excavated before the mound was commenced, eight by twelve feet and seven in depth. Along each side and across the ends, upright timbers had been placed, which supported timbers thrown across the vault as a ceiling. These timbers were covered with loose unhewn stone, common to the neighborhood. The timbers had rotted and had tumbled into the vault. . . .

²⁸ J. W. Foster, “Prehistoric Races of the United States of America,” 6th ed., p. 112.

²⁹ *Ibid.*, pp. 186-187.

In this vault were two human skeletons, one of which had no ornaments; the other was surrounded by six hundred and fifty ivory (shell) beads, and an ivory (bone) ornament, six inches long.

"In sinking the shaft, at thirty-four feet above the first or bottom vault a similar one was found, enclosing a skeleton which had been decorated with a profusion of shell-beads, copper-rings, and plates of mica."³⁰

All this goes to show that the same idea of death was associated with the dismal cloud-mountain by the Mexicans, Peruvians, Mound Builders, and Egyptians. So it was also in Babylonia, the colossal zikkurats lifting their lofty summits in honor of the same cloud-mountain.

Herman V. Hilprecht says: "I have recently found evidence that, like the Egyptian pyramid, the Babylonian stage-tower (or step-pyramid) without doubt was viewed in the light of a sepulchral mound erected in honor of a god." Our author adds: "I am also inclined to see a last reminiscence of the Babylonian zikkurat in the meftûl, the characteristic watch-tower and defensive bulwark of the present Ma'dân tribes of Central Babylonia."³¹

Daniel G. Brinton tells of a like tower built by the lord of Tezcuco, which to our minds also reflects the old source of inspiration. Brinton says: "Nezahutal erected a temple nine stories high to represent the nine heavens, which he dedicated 'to the Unknown God, the Cause of Causes.' This temple, he ordained, should never be polluted by blood, nor should any graven image ever be set up within its precincts."³²

The type of the holy cloud-mountain was reproduced in

³⁰ *Ibid.*, pp. 190-191.

³¹ "Explorations in Bible Lands During the Nineteenth Century," p. 287.

³² "The Myths of the New World," 3d ed., p. 73.

every palace and temple of Babylonia,³³ sometimes by building it as an artificial mound with trees and plants watered from above; again, on a larger scale by the zikkurat or 'Mountain Peak,' the later device being a sort of pyramid of three, five, or seven stages.

"One of these is the zikkurat to Nin-girsu at Lagash, which Gudea describes as 'the house of seven divisions of the world'; the other, the tower at Uruk, which bore the name 'house of seven zones.' The reference in both cases is, as Jensen has shown, to the seven concentric zones into which the earth was divided by the Babylonians. It is a conception that we encounter in India and Persia, and that survives in the seven 'climates' into which the world was divided by Greek and Arabic geographers. It seems clear that this interpretation of the number seven is older than the one which identified each story with one of the planets."³⁴

This leads us into another field of research, and in passing it may be well to glance at the significance of this mystical number. Jastrow adds: "The suggestion is worthy of consideration whether the name 'seven directions of heaven and earth' may not also point to a conception of seven zones dividing the heavens as well as the earth. One is reminded of the 'seven' heavens of Arabic theology."³⁵ One is also reminded of the seven ropes that twirled the sky-mountain of the Hindus.

Heaped were the mountains in heaps. The serpents began to twine—
There were seven of these 'Fiery Phantoms,' that twirled away at the
line,

Over them rushed heaven's ocean,—Anu a river broad
Which flowed round this world of ours, around where the monster clawed.

³³ The palaces were veritable terrestrial paradises. The name shows the origin, for paradise (in Sanskrit, *para desa*) means literally high land.

³⁴ Jastrow, "Religion of Babylonia and Assyria," ch. xxvi, pp. 619-620.

³⁵ *Ibid.*

Ea, alias the 'House of the Waters,' lived in this ocean vast,
An 'Exalted Fish' they called him, in the story of Vishnu cast.

The fact that this great mountain always turned upon its axis in an easterly course is probably the reason why the following strange passage occurs in the Book of the Dead.

It's written in the 'Ritual'—"Retreat,
Retreat," it says, "Unto the eastern heavens,
Unto the dwellings which support the mount—
That great mysterious mountain that spreads light
Among the gods," high in the northern sky.

Such was the substance of the direction given to the dead to guide them on their skyward journey to the 'Blessed Land.' In the pyramid built for King Teta (about 3300 B. C.) the following text occurs: "Teta comes to the two heavens, Teta arrives at the two earths, Teta treads upon the herbage growing under the feet of Seb, he traverses the road of Nu-t." ³⁶

The mountain chambers, the Hall of Two Truths, and Set or Seb, the verdant earth, are all depicted before the departed Teta, and he is told that he must traverse the road of Nu-t; that is, the sky-road. This sky, according to some, extended overhead like an immense iron ceiling, and, according to others, like a huge shallow vault. For this reason "iron, like many other things in Egypt, was pure or impure according to circumstances. If some traditions held it up to odium as an evil thing, and stigmatized it as the 'bones of Typhon,' other traditions, equally venerable, affirmed that it was the very substance of the canopy of heaven. So authoritative was this view, that iron was currently known as '*Ba-en-pet*,' or the celestial metal." ³⁷

It was plain even to the ancients that such a sky could not remain unsupported in space, therefore Nu-t was supposed

³⁶ *Scientific American Supplement* No. 1075.

³⁷ G. Maspero, "Manual of Egyptian Archaeology," trans. Amelia B. Edwards, 1895, p. 196.

to be sustained in her lofty position by her arms and legs. These made four pillars; accordingly their temples were planned to illustrate this idea. "The columns, and if needful the four corners of the chambers, stood for the pillars. The roof, vaulted at Abydos, flat elsewhere, corresponded exactly with the Egyptian idea of the sky. Each of these parts was, therefore, decorated in consonance with its meaning. Those next to the ground were clothed with vegetation. The bases of the columns were surrounded by leaves."³⁸ The vaulted roof sometimes contained stars. At others serpents, the various names of which are 'Fire Face,' 'Flaming Eye,' 'Evil Eye,' etc.³⁹

The Egyptians kept a festival to commemorate the suspension of the sky by the ancient god Ptah, 'the Opener,' who was venerated as creator of the world. J. Norman Lockyer says:

"About 5300 B. C. we seem almost in the time of the divine dynasties, and begin to understand how it is that in the old traditions Ptah precedes Rā and is called 'the father of the beginnings, and the creator of the egg of the Sun and Moon.'"⁴⁰ After Ptah came the great Sun-god Rā, whose father was Nu or Nu-t. Rā waged war against the demon of darkness called Apap or Apapi, who was a serpent. He journeyed over Nu-t's back, traversed over the road of Nu-t.

This Nu-t is represented in her drawings as a female figure spanning the heavens, her finger-tips touching the one horizon and her toes the other. Nu-t, like all the canopies, was the 'mother of the gods.' In the Hindu and Babylonian myths we have seen that the vapor-belt was credited with being the source of life both in the heavens and in the earth. The canopy diffused the solar rays and diffusion seems to

³⁸ *Ibid.*, p. 90. ³⁹ *Ibid.*, p. 164.

⁴⁰ "The Dawn of Astronomy," ch. xxxi, p. 318. Brugsch, "Religion und Mythologie," p. 111. Pierret, "*Salle Historique de la Galerie Egyptienne*" (*du Louvre*), p. 199.

have made confusion, for with each new aspect of light a new god was born. Thus the list was ever being increased, and yet, after all, how many gods were there? Many were closely related and many more may be proved to be actually identical. For instance, Hathor, the cow-headed (*i.e.*, cloud-headed) was worshiped at Denderah. She was born out from and in the cloud, and is certainly only another aspect of the archèd Nu-t. She also, like Nu-t, is said to have been the 'mother of all living,' but what is of more importance is that she is identified with Aphrodite and corresponds to Ishtar, and some enthusiasts have even gone so far as to say that her cult can be traced in the worship of the aborigines of North America, but this similarity is only a witness of the common phenomenon personified and deified both in the east and in the west. As Aphrodite was the goddess of eternal light, it is probable that Hathor was that aspect of perpetual illumination seen in Nu-t and which the Hindus recorded by saying that "Agni was Varuna and was Indra too."

Sometimes Nu-t is represented double, a larger stretching over a smaller one. The outer one is studded with stars. The inner one, however, is plainly a band of water. These wheels within wheels suggest a firmament above and below, and they show us the evolutionary process by which it came about that the vapor-belt was looked upon as the 'mother.' Ascending and descending on Nu-t's curved back, athwart the vaulted sky, are boats containing the gods. These, of course, were shells of light (halos) surrounding the heavenly orbs.

These boats or halos seen ascending and descending on Nu-t's body were the origin of many customs and myths. At first baris or barks sustained on the priest's shoulders were carried in procession.

In these, "hidden from the sight of every profane eye, were supposed to be stationed those renowned gods descended from the Vedic Aria upon the land of Kemi at successive and

unknown epochs: Ph-t-ah, or Agny, meaning fire; Ph-Ra, an equivalent of Re, Ra, Ri, La, El, the sun (*i.e.*, shiner); Jom, an equivalent of Om, Aom, and Homa; Sevek, *i.e.*, Siva; and Asiri, the equivalent of Asura. These were the Indian deities and titles with which the analogy of the Egyptian gods and goddesses is thus indicated.”⁴¹

These baris also contained the local conceptions of the gods, many of them half monster, half woman.

Menes, according to the historical record, is the first king of the first dynasty. He was reputed to be “the successor of Asiri, the son and god of the dead; he belongs to the first Vedic tradition, like the Sanskrit Manu, son of the Sun and brother of the Asura Yama, the god of the dead; like the Manes of Lydia, son of Cronus; like the Cretan Menos, son of Zeus; the Minyas of Iolcus, son of Titan, and the Manus of Germany, son of Chaos.”⁴²

But to return to the custom of taking the gods around in boats. In Egypt the display naturally sought the waters of the Nile, and as the whole procedure was associated with death, it was not long before funeral rites began to develop along the same lines. Thus sacred barks were built, after the model of the bari, in which the mummy was conveyed to its last resting place, the idea being that as the gods floated in boats over the canopy-sea, so also their sacred dead were required to journey. “In their effort to restore the dead men to the happy island-home, the heavenly land beyond the water, the Norsemen actually set their dead heroes afloat in boats on the open ocean.”⁴³ The world wide conception being that the canopy-sea was connected with the terrestrial ocean. The island-home refers to the Isles of the Blessed, the egg-hole of the north.

⁴¹ F. De Lanoye, “Wonders of Art and Archæology in Egypt 3300 Years Ago,” p. 78.

⁴² *Ibid.*, p. 287.

⁴³ Poor, “Sanskrit and Kindred Literatures,” pp. 371, 372.

In the boat in which the sun-god of Egypt took his daily ride on the Nile, a shrine was placed amidships, which was covered with a veil to conceal him from the eyes of the spectators.

Looking at the original diurnal journey of the sun across the canopy, the record shows that he was at one time lost, as it were, in the folds of Apapi. G. Maspero says: "After the fifth hour, the heavenly ocean became a vast battle-field. The gods of light pursued, captured, and bound the serpent Apapi, and at the twelfth hour they strangled him. But this triumph was not of long duration. Scarcely had the sun achieved this victory when his bark was borne by the tide into the realm of the night hours."⁴⁴

It is interesting to find that this custom has continued down to the present day, and it is instructive, for it shows us with what tenacity an idea is passed from one generation to another. We may well surmise that any such relics surviving the last thousand years may have come down through indefinite ages. Two illustrations of the present-day survivals will suffice. The khedive of Egypt still sends to Mecca as an annual gift a tabernacle, known as Mahmal, that presents the outline of a ship. We find the other illustration in India. Frank S. Dobbins says:

"As of almost all the gods, Ganesha (the elephant god) has his festivals, when the people come together in great crowds to do him honor. At one of these annual festivals they bring forth the god Ganesha, place him in a boat, and, accompanied with other boats containing priests and musicians, they row up and down the Ganges. The great crowds of people lining the shore fill the air with their shouts and songs, and the occasion is one of exuberant joy."⁴⁵

Modified by art, beautiful stories have grown from the

⁴⁴ "Manual of Egyptian Archæology," trans. Amelia B. Edwards, p. 164.

⁴⁵ "Gods and Devils of Mankind," p. 269.

same myth. 'Lohengrin' is one of these. With a few alterations, we give it as told by Charles De B. Mills. He tells us that:

"Lohengrin is one of those heroes, half unearthly, who come, men know not whence, and are first seen sleeping in a boat upon a river. Lohengrin was son of Percival, and he heard once the peal of a bell far away, untouched by human hands, in the temple of the Grail at Montsalvatch. That peal was a signal that help was needed. He arose and was starting, not knowing whither he should go. Foot in stirrup, ready to mount his horse, he saw a swan on the river, drawing a ship along. 'Take back the horse to its stable,' said he. 'I will go with the bird, whither it shall lead.' Five days he was on the water, drawn in his boat not only, but supplied with nourishment by the faithful bird. At the end of this time, they came where the lists were opened by Frederick Von Telramund, a brave knight, who would fight against any champion she might bring forward for possession of Elsa of Brabant, who had refused his suit. Lohengrin undertook the defense of the Lady, fought, prevailed, slew Frederick, and in return was offered her hand and the duchy. He accepted it on condition: she must never ask his race. Happily they lived together for a time, but one night, piqued with curiosity and stung with insinuations and reproaches she had heard, she did put the fatal question.

"Lohengrin sorrowfully called his children together, kissed them, and said: 'Here are my horn and my sword, keep them carefully; and here, my wife, is the ring my mother gave me; never part with it.' At break of day, the swan reappeared, drawing the boat, Lohengrin reëntered and disappeared, nevermore to return.

"This story ought to be transparent enough. It is the reproduction of the old, old tale, the prince wedded to the dawn (or, rather, the sun wedded to the canopy, for it seems that the original myth dealt not with the daily occurrence

but with the yearly phenomenon). He had rescued the maiden, marries her, but cannot remain with her; he comes in a boat (a shell of light, a halo), and he also goes in a boat, drawn by the faithful swan that swims the cerulean seas. There is a close relation of this tale with those of Melusina, of Undine, of Pururavas and Urvashi, Eros and Psyche, etc. 'Lohengrin' is one of a family of stories celebrating Knights of the Swan."⁴⁶

⁴⁶ "The Tree of Mythology," pp. 91-93.

CHAPTER XVII

MYTHS OF GREECE AND ROME

News! what news? Has it in truth then ended,
The term appointed for that wondrous sleep?
Has Earth so well her fairest brood defended
Within her bosom? Was their slumber deep?
Not this our dreamless rest that knows no waking,
But that to which the years are as a day?
What! are they coming back, their prison breaking,—
These gods of Homer's chant, of Pindar's lay?

Olympia? Yes, strange tidings from the city
Which pious mortals builded, stone by stone,
For those old gods of Hellas, half in pity
Of their storm-mantled height and dwelling lone,—
Their seat upon the mountain overhanging
Where Zeus withdrew behind the rolling cloud,
Where crowned Apollo sang, the phorminx twanging,
And at Poseidon's word the forests bowed.

Ay, but that fated day
When from the plain Olympia passed away;
When ceased the oracles, and long unwept
Amid their fanes the gods deserted fell,
While sacerdotal ages, as they slept,
The ruin covered well! ¹

Just as in the case with the other nations, the beings called gods by the Greeks are only personifications of the powers and objects of nature, and the legends likewise are only representations of the courses of nature and its operations.

The farther back the myths are traced, the more closely the gods become associated with the scenes of the canopy. Thus the Greek sky-god, Zeus, corresponds to the Hindu sky-god, Dyaus. The word is derived from the root 'dyu,' which

¹ Stedman's "News From Olympia."

means 'to shine.' He was the 'Heaven father' called by the Hindus Dyaus-pitar, by the Romans Diouis-pater or Jupiter, by the Greeks Zeus-pater. Uranus means 'the coverer.' His name is derived from the root 'var.' He is identified with the Hindu Varuna, the vault of heaven.² Hera comes from the Sanskrit root 'svar' the bright sky. Oannes, half man, half fish, was an Eastern god, the Lord of Darkness. His name is derived from the Hindu Anu. Apollo may be derived from a Sanskrit form, Apa-var-yan or Apa-val-yan, and may mean 'one who opens the gate of the sky.'³ At some remote period, probably, the ancestors of the Greeks said: "The one who opens the gate of the sky pursues the burning one (Dahana)." This soon assumed the form, Apollo courted Daphne and she fled from him and was turned into a laurel tree. The significance of the tree in mythology will be enlarged upon later when we come to consider the World-ash of Scandinavia.

Some other scholars—Schroder, for instance—think that Apollo is derived from the Vedic Saparagenya, an epithet of Agni. This again brings us to the canopy, as Agni was the light seen in the great world-blanket. It is strange, but the theft of fire seems to be the theme-root in both cases.

Herodotus says: "Whence each of the gods sprung, whether they existed always, and of what form they were, was, so to speak, unknown till yesterday. For I am of opinion that Hesiod and Homer lived four hundred years before my time, and not more, and these were they who framed a theogony for the Greeks, and gave names to the gods, and assigned to them honors and arts, and declared their several forms." * * * "Indeed, the names of almost all the gods came from Egypt into Greece; for that they came from barbarians I find on inquiry to be the case; and I think they chiefly proceeded from Egypt."⁴

² Hopkins, "Religions of India," pp. 166, 167.

³ Max Müller, ii, 692-697. ⁴ B. ii, 50, 53, Cary's translation.

The astronomical systems of the Egyptians and the Greeks also show clearly the effects of a common origin, the original sky-canopy ring system. "F. A. Paley aids the imagination of his readers as follows: 'We might familiarly illustrate the Hesiodic notion of the flat circular earth and the convex overarching sky by a circular plate with a hemispherical dish-cover of metal placed over it and concealing it. Above the cover (which is supposed to rotate on an axis) live the gods. Round the inner concavity is the path of the sun, giving light to the earth below.'" ⁵

Aristotle tells plainly that the sky was solid. The great philosopher of Stagira said: "The universe is a fixed point; the central point is earth, and above it is a bounding field." "Stars," he added, "are fixed to it like studs." Euclid and Cicero also taught that the stars were fixed in a solid sphere. The astral note from Egypt comes from Claudius Ptolemæus. His 'Heavens of the Spheres' were composed of nine concentric circles, including the fire ring. All of which were of glass. This latter, or fire-ring, seems to have been a reminiscence of the fire or sunlight seen in the old canopy when Agni was Varuna and was Indra too. It was located nearer to the earth than any of the other spheres. This whole peculiar astronomical conception undoubtedly grew out of the old method of thought, and it was not until the time of Seneca that the question was raised against it. How heretical the following must have sounded: "Is the sky solid and of a firm and compact substance?" They had always been taught that it was.

In connection with the idea of concentric rings, it is interesting to find that the Finn cosmogonists actually believed that the world was one huge egg, the sky the shell, and the yolk the earth. The Norsemen contended that the sky was Ymer's skull, the earth his flesh, and the rocks his bones.

⁵ "The Epics of Hesiod, with an English Commentary," London, 1861, p. 172.

It is significant that Ymer seems originally to have meant the sea—the word being akin to the Latin *mare*.⁶ The Hindus supposed that the world stood on a turtle's back. Ruskin says: "The tortoise shell, the image of the dappled concave of the cloudy sky." Cooper says: "With reference to the turtle, there is probability in the view that the name of this animal was first given as a symbol of the world, the upper shell representing the sky, the under shell the earth, and the body between the two the atmosphere."⁷

Between the shells of the turtle we can imagine that Chaos Nox and Darkness reigned. Erebus, or blackness, was a veritable existence. All the cosmogonies begin with this 'Age of Darkness.' Orpheus says: "From the beginning the gloomy night enveloped and obscured all things that were under the ether. The earth was invisible on account of the darkness, but the light broke through the ether and illuminated the earth."

Sanchoniathon was a Phœnician and only fragments of his writings survive. He tells us that "the beginning of all things was a condensed, windy air, or a breeze of thick air, and a chaos turbid and black as Erebus. Out of this chaos was generated Môt, which some call Ilus, but others the putrefaction of a watery mixture. And from this sprang all the seed of the creation, and the generation of the universe. * * * And when the air began to send forth light, winds were produced and clouds, and very great defluxions and torrents of the heavenly waters."

Berosus, the Babylonian whose records have been preserved in the temple of Belus, says: "There was a time in which there existed nothing but darkness and an abyss of waters, wherein resided most hideous beings, which were produced of a twofold principle."

⁶ Cooper, "Serpent Myths," p. 17.

⁷ Charles De B. Mills, "The Tree of Mythology," pp. 34, 35.

“From the ‘Laws of Menu,’ of the Hindus, we learn that the universe existed at first in darkness.” The following text is taken from the Vedas: “The Supreme Being alone existed; afterward there was universal darkness; next the watery ocean was produced by the diffusion of virtue.”

The Thlinkeets of British Columbia say: “Very dark, damp, and chaotic was the world in the beginning; nothing with breath or body moved there except Yehl; in the likeness of a raven he brooded over the mist; his black winds beat down the vast confusion; the waters went back before him and the dry land appeared. The Thlinkeets were placed on the earth—though how or when does not exactly appear—while the world was still in darkness, and without sun, moon, or stars.”⁸

Pythias, in the early times, before the mariner’s compass was invented, coasted from Marseilles to the Shetland Isles. On one occasion, when he returned, he declared that his progress was stopped by an immense black clam or oyster, which was suspended in the air. And he further declared that if any ship advanced toward it it would be swallowed up in its gigantic shell.

In the Greek cosmogony Chaos gave way to Uranus, the shining canopy or coverer, and to Pontus, the sky-ocean.

It is recorded of Uranus that he hated all his children, and directly after their birth he placed them under the Tartarian pall; that is, he hid them in darkness. Cronus then dethroned him, the new forms supplanting the old. But in turn he did even worse by his offspring, for it is said that he devoured the first five. In order to save the sixth, Rhea, his wife, “succeeded in duping her husband by giving him a stone (perhaps rudely hewn into the figure of an infant) wrapped in swaddling-clothes, which he swallowed, believing he had got rid of another danger.

⁸ Bancroft, “Native Races,” vol. iii, p. 98. Ignatius Donnelly, “Ragnarok,” pp. 208, 209, 213.

"While the husband was being deceived in this fashion, Zeus, the newly-born child (the true sky), was conveyed to the island of Crete, and there concealed in a cave on Mount Ida. The nymphs Adrastea and Ida tended and nursed him, the goat Amalthea supplied him with milk, bees gathered honey for him, and in the meantime, lest his infantile cries should reach the ears of Cronus, Rhea's servants, the Curētes, were appointed to keep up a continual noise and din in the neighborhood by dancing and clashing their swords and shields.

"When Zeus (the true sky) had grown to manhood he succeeded by the aid of Gaea, or perhaps of Metis, in persuading Cronus to bring back into the light the sons whom he had swallowed and the stone which had been given him in deceit. The stone was placed at Delphi as a memorial for all time. The liberated gods joined their brethren in a league to drive their father from the throne and set Zeus in his place."⁹

The age of Cronus is called the 'Golden,' for he was the protecting god, blanketing the earth as under a greenhouse roof. His name means the 'Dark One.' But as this signifies nothing in this age, it being unintelligible to modern thought, confusion has naturally followed. Thus, Max Müller says he is Time (?); Kuhn, Midnight-sky; Sayce, the sun; Canon Taylor, Star-swallowing sky; Tiel, Midnight-sky, Under-world, etc.; Hartung, Sun scorching spring. Thus the authorities are set in confusion. Now, in the light of the present hypothesis all is clear: the new-born scenes were smothered by the dark one, and thus hidden from the earth. Bright Zeus (Jupiter), the true sky, alone escaped this fate.

As we have seen, the liberated gods, according to the legend, now decided to enthrone Zeus in his rightful place, but the Titans, the elder gods, did not acquiesce to this

⁹Murray, "Manual of Mythology," 20th ed., pp. 45-46.

change of government. These giants sprang from the blood of Uranus, the old ring; they were of such monstrous size, being closer to the eye than the other sky-forms, and they were of such fearful appearance, that it is no wonder that the people of Greece thought that they were swallowing up all the other gods. They were twelve in number. Amongst them were Oceanus, whose very name suggests water, and whose children were all mythological rivers, Alphesu, Peneus, etc.; his daughters were called the Oceanides. Hyperion was another one of the twelve. He seems to have been the light in the canopy, for he is credited with being the father of Helios, the sun; Selene, the moon; and Eos, or Aurora, the dawn. Of course all these lights were first seen in the canopy. Iapetus, or Japetus, was the father of Atlas, whom all know so well because of his bearing the vapor globe on his back. Iapetus was imprisoned with Cronus, the old vapor sky in Tartarus, the black canopy. Cronus is also one of the Titans. His wife, Rhea, whose Latin name is Cybele, like all the canopies was called 'the mother' because she was the mother of the gods, the Magna Mater. She is of the same nature as Nu-t, with whom she may be identified.

We have mentioned the fact that the Titans did not acquiesce in the change of government brought about by the gods liberated from the maw of Cronus, hence war broke out. In other words, though the clear sky had appeared, remnants of the old canopies still lingered, and these vapor-forms were said to be warring with the new gods, who time and again slew them. Yet, nothing fearing, these great giants of the fallen canopy ever returned to the attack.

It is said that they took up Ossa (a cloud mountain) and piled it on the top of Mount Pelion (another cloud mountain), and from this great height they sprang upon Olympus, the home mountain of the new race of gods.¹⁰ It is then said

¹⁰ The cloud-mountains, of which Olympus was the mightiest, were permanent features in the upper atmosphere, and are not to be con-

that these giants drove the gods and heroes down into Egypt, that is, into the southern sky, which alone remained clear and open from their black, gigantic forms. Apollo, the sun, was changed into a crow, a ka, or kaw, a soul separated from its body; that is, an outcast hidden in the vapor. Zeus (Jupiter, Jove), the pure sky, was changed into a raven; that is, black cloudlets floated athwart his fair face. Disguised thus, he was sacrificed unto the spirit of the watery waste. Hera (Juno) was turned into a red-cow, which recalls to our mind the fact that in the Hindu myths lowing kine were clouds. Venus, like Ea, was changed into a fish.

The mountains skipped like rams, the little hills
Like lambs, or young sons of the flock, the clouds.
No wonder that the Psalmist asked the sea
What ailed it, that it fled away and fell.
The Giants falling covered the pure sky,
And solid flint was changed into a stream.¹¹

After many days Pallas Athene (Minerva), who was the offspring of Zeus, without a mother, and whom the records tell us sprang from his head completely armed, invented for her father thunderbolts. With these he hurried back to the war. The open sky brought our modern storm with it, thus thunder was a newly invented thing, and it is further recorded that with its might he subdued the giants one and all.

O Thunderer! O mighty Thunderer!
O wondrous blue sky that hast come to stay!
We scarce may think of thee when thou didst dwell
Above Olympus, when the mind of man
Knew not and saw not save by sound in ear.—
He heard thy infant voice as thunder speak,
And, hearing, knew a change was coming soon.
It seems so strange, O Zeus, that once there was
A curtain hanging o'er thy face, a veil,

fused with the fleeting storm forms. These mountains held their position under the uplifting influence of a zonal canopy-belt which prevented the radiation of their heat, and thus the lighter than air vapors were drawn to immense heights.

¹¹ Ps. cxiv:4-8.

And man, so puny, knew, but saw you not!—
 To see a god was death to mortals then.—
 Behold thy glory filled his troubled dreams!
 A nightmare grand, and yet perchance he waked,
 And, waking, found thy dreamy vapors real!
 Clouds piled on clouds on top of other clouds,
 As mountains heaped on mountains reaching high—
 A ladder which the hosts of heaven used.
 So dreaming of a daily sight to him
 Young Jacob felt the God of Nature near.—
 Unveiled, uncloaked the Titans all have gone,
 But thou, O Thunderer, hast come to stay!
 Personified. Hie! Storm King, rule each shower!

Pallas Athene, the goddess of Wisdom, it will be remembered, sprang from her father's head fully equipped for the fray. Wisdom burst upon man when the clear sky caused their gods to evaporate.¹² She was 'Queen of the Air,' as Ruskin says:

Full many arrows did she turn aside,
 And many heroes by her arrows fell.
 Thus waged the war of falling canopies,
 Thus waged the battle of the changing sea,
 And changes brought with them the light of wisdom.
 Minerva-like, thought after thought sprang up
 From the true sky in burning eloquence—
 The visions of the past were now no more.

Perhaps the greatest event in this last battlefield of the gods is Apollo's (the sun's) victory over the serpent-ring, Python. In honor of his victory Byron sings:

"The lord of the unerring bow
 The God of life, and poesy, and light—
 The Sun, in human limbs array'd, and brow
 All radiant from his triumph in the fight,
 The shaft hath just been shot the arrow bright

¹² In our chapter on "Genesis" it will be remembered that the cause of the removal of the Eden Canopy was to bring wisdom to man. He had eaten of the tree of the knowledge of good and evil. Natural things had therefore to pass away, that he might be led to see the spiritual; that he might be led to worship the Creator instead of his works.

With an immortal's vengeance; in his eye
And nostril beautiful disdain, and might
And majesty, flash their full lightnings by
Developing the glance of Deity."¹³

This picture of the sun personified
Portrays the universal scene again—
A wheeling and a whirling glory hid
By heaven's curtains drawn about a lamp,
Much magnified to many times its size,
And mock suns keeping company with the real
All girt with halos and diffused light—
Like luminous bright circles born of fire.
A heaven-wide battlefield all bloody red
Revolving world-clouds and a misty haze,
And towards the pole a helix spinning round
The Isle of Delos, or the serpent's egg.—
Known in the myths as the waste floating rock,
The cave-hole of the north, the starry sea.

This open place is of such mythological interest that our readers will pardon us if we digress from our subject in order to investigate some of its beauties. "In ancient cosmology the 'door of heaven' was situated at the North Pole of the sky."¹⁴

Job refers to the open place as the "Island of the Innocent."¹⁵ The Tacullies say, God first created an island. Greek traditions fix the Upa-Merou as the birthplace of the human race, and the Egyptians claim that their ancestors came from the Island of Mero. Among the Hindus Meru was the land of the gods, the place where deity was shrouded in darkness and mystery. Phaëton, whose story was told in our last chapter, was a scorching canopy. He was the son of Merops, and Theopompus tells us that the people who inhabited Atlantis were the Meropes, the people of Merou.

In the Hindu legends the great battle between Rama and Ravana, the sun and the canopy, took place on the island of

¹³ "Childe Harold," iv, 161. Certain liberties taken with the last line.

¹⁴ Khândogya-Upanishad, xxiv, 3, 4, 7, 8, 11, 12. "Sacred Books of the East," vol. i, pt. i, pp. 36, 37. ¹⁵ Job xxii:30.

Lanka. Rama built a stone bridge which reminds us of the Bifrost bridge of the Scandinavians. It was sixty miles long and reached to the island. This island again carries us to the North Land. It reminds us of Asgard, which lay to the west of Europe and was reached by the Bridge. It was to the east and west that the pillars of the canopy were seen dipping, or, we should say, rising and setting, against the horizon. In the Arabian legends we have the scene of the world catastrophe described as an island. Here the gods of Scandinavia met their doomsday. It was the place where the three cloud-mountain chains went out as three roots of the great tree Ygdrasil. It was the place of the sacred tree of the 'world-mountain' that the Hindu legends refer to. And its top we see was Olympus, below it was hell, and in between was the open-eye, Ymer, where Odin left his precious eye in pawn. It was the Island of Meru or Merou.

The Ojibways cross to paradise on a great snake, which serves as a bridge. The Choctaw bridge is a slippery pine-log. The South American Manacicas cross on a wooden bridge.

"Among some of the North American tribes 'the souls come to a great lake' (the eye-hole or cave) 'where there is a beautiful island, toward which they paddle in a canoe of white stone. On the way there arises a storm, and the wicked souls are wrecked, and the heaps of their bones are to be seen under the water, but the good reach the happy island.'"

"The Slav believed in a pathway or road which led to the other world; and, since the journey was long, they put boots into the coffin (for it was made on foot), and coins to pay the ferrying across a wide sea, even as the Greeks expected to be carried over the Styx by Charon. This abode of the dead, at the end of this long pathway, was an island, a warm, fertile land, called Buyan."¹⁶

¹⁶ Tylor, "Early Mankind," p. 362. Poor, "Sanskrit and Kindred Literatures," pp. 371, 372. Donnelly, "Ragnarok," pp. 386, 387.

Ovid's earth was surrounded by the ocean. "And along the outer strand of that sea they gave lands for the giant-races to dwell in, and against the attack of restless giants they built a burg within the sea and around the earth."

This is the spot where Apollo, or the sun, first appeared, hence it was said that he was born there (Isle of Delos). His father was Zeus, the pure sky, and his mother Latona, or the shade, from whence he was seen to emerge. Latona was the concealing hiding thing, the canopy.

This eye-hole spot where Apollo was born is also the Diktaian cave in which the infant Zeus, his father, the clear sky, was born. The Lake and the Cave in our nursery tale—the Lady descending into the Lake and rising from the Cave, etc., etc.—are in every sense the far-north land, the country of the Hyperboreans, from whose caverns the piercing blasts of the north wind are said to have issued.

Many of the myths we have just cited referred to this lake as an island. We would now point out that it was likewise of necessity a cave. The Greeks and Egyptians considered it the birthplace of their respective races. The following legends throws some light on the reason why this clear-spot was regarded as the beginning place. The Choc-taws say that in Nanih waiga, the sloping hill "was a cave, the house of the Master of Breath. Here he made the first men from the clay around him, and, as at that time the waters covered the earth, he raised the wall to dry them on. When the soft mud had hardened into elastic flesh and firm bone, he banished the waters to their channels and beds, and gave the dry land to his creatures."¹⁷

The Indians, along with the rest of the inhabitants of the earth that then was, saw new conditions continually arising in the egg-hole. They saw hordes of animals and even strange races of their fellow beings coming down from the far north, driven forward by some last advance of the departing Ice

¹⁷ Brinton, "Myths of the New World," p. 247.

age. They saw all this and imagined that these creatures, like the sky scenes, had all originated up there in that cave-hole region, hence it was to them the beginning place.

"A parallel to the legend just cited occurs among the Six Nations of the North. They with one consent looked to a mountain near the falls of the Oswego River, in the State of New York, as the locality where their forefathers saw the light of day; and their name, Oneida, signifies 'the people of the stone.'

"The cave of Pacarin-Tampu, the Lodgings of the Dawn, or the Place of Birth of the Peruvians, was five leagues distant from Cuzco, surrounded by a sacred grove, and inclosed with temples of great antiquity.

"From its hallowed recesses," says Balboa, "the mythical civilizers of Peru, the first men, emerged, and in it, during the time of the flood, the remnants of the race escaped the fury of the waves."¹⁸

Though the Place of Birth in the above myths has been assigned to specific geographical localities, yet it is evident from the context that originally the place of beginning had a mythological horizon. The egg-hole of the Peruvians may have been in the Southern sky.

Donnelly also gives the following: "The philosopher of Oraibi tells us that the people climbed a ladder or magical tree from the cave-hole to this world. The firmament, the ceiling of this world, was low down upon the earth—the floor of this world. This was an age of cold and darkness and there was as yet no sun or moon."

Naturally darkness is associated with this cave-hole, Latona; the shade kept drawing in closer and closer until at last the inner edge was precipitated. During this stage, as the Oraibis say, "it was an age of cold and darkness." The ancient Britons tell us of the same conditions. They say that:

¹⁸ "Ragnarok," pp. 201, 202.

"The profligacy of mankind provoked the great Supreme to send a pestilential wind upon the earth. A pure poison descended, every blast was death. At this time the patriarch, distinguished for his integrity, was shut up, together with his select company, in the inclosure with the strong door. Here the just ones were safe from injury. Presently a tempest of fire arose. It split the earth asunder to the great deep. The lake Llion burst its bounds, and the waves of the sea lifted themselves on high around the borders of Britain, the rain poured down from heaven, and the waters covered the earth."¹⁹

The blast of poisonous vapor indicates the dispersion of the gaseous canopy, which in our scientific chapters was figured as floating above the atmosphere. It may have consisted in part of carbon dioxide, but be this as it may, its rupture meant the fall of the cloud-vapors and belts, which had attained great heights in the atmosphere, carried upward by their own buoyancy. Water-vapor being lighter than air, and radiation, and hence condensation, being prevented by the overruling blanket, these phenomena of raised mountain-clouds, and an open lake space in the north, were inevitable. When the canopy itself was ruptured, the above myth goes on to tell us, Lake Llion, the sky-hole, burst its bounds. Many other tribes and tongues and peoples have recorded this same break-up.

"The Algonquins believed in a world, an earth, anterior to this of ours, but one without light or human inhabitants. A lake burst its bounds and submerged it wholly."²⁰

The Aztecs prayed to Tezcatlipoca, who was represented as a flying serpent—that is, they prayed to the canopy, to the god of the black waters—and their cry was: "Is it possible that this lash and chastisement are not given for our correction and amendment, but only for our total destruction

¹⁹ "Mythology of the British Druids," p. 226.

²⁰ "Ragnarok," p. 222.

and overthrow; that the sun will never more shine upon us, but that we must remain in perpetual darkness? * * * It is a sore thing to tell how we are all in darkness. * * * O Lord, * * * make an end of this smoke and fog. Quench also the burning and destroying fire of thine anger; let serenity come and clearness, let the small birds of the people begin to sing and approach the sun.”²¹

The Chinese historians say that “P’an-ku came forth in the midst of the great chaotic void, and we know not his origin; that he knew the rationale of heaven and earth, and comprehended the changes of the darkness and the light.” These annals tell us further of the “Ten Stems” or stages of canopy development: “At Wu—the Sixth Stem—the Darkness and the Light unite with injurious effects; all things become solid (frozen), and the Darkness destroys the growth of all things. At Kung—the Seventh Stem—the Darkness nips all things. At Jin—the Ninth Stem—the Light begins to nourish all things in the recesses below. Lastly, at Tsze, all things begin to germinate.”²²

This last myth hints at the coming birth of the sun. The edges of the cave-hole began to grow bright, so, naturally, when the sun did appear they said (in Greece) “Latona or the shade was his mother.” This part of the development is beautifully set forth in the Oraibi legend, some portions of which we have already quoted, but, after all, it will be seen that the Indians departed further from the ways of nature than did the Greeks. We will now cite that portion which pertains to the creation of the sun and moon: “Machito, one of their gods, raised the firmament on his shoulders to where it is now seen. Still the world was dark, as there was no sun, no moon, and no stars. So the people murmured because of the darkness and the cold. Machito said, “Bring me

²¹ Bancroft, “Native Races,” vol. iii, p. 204.

²² “Compendium of Wong-shi-Shing,” as quoted in “Ragnarok,” pp. 210-211.

seven maidens;" and they brought him seven maidens; and he said, "Bring me seven baskets of cotton-bolls;" and they brought him seven baskets of cotton-bolls; and he taught the seven maidens to weave a magical fabric from the cotton, and when they had finished it he held it aloft, and the breeze carried it away toward the firmament, and in the twinkling of an eye it was transformed into a beautiful and full-orbed moon; and the same breeze caught the remnants of fluctuant cotton, which the maidens had scattered during their work, and carried them aloft, and they were transformed into bright stars. But still it was cold; and the people murmured again, and Machito said, "Bring me seven buffalo-robcs," and from the densely matted hair of the robes he wove another fabric, which the storm carried away into the sky, and it was transformed into the full-orbed sun. Then Machito appointed times and seasons, and ways for the heavenly bodies; and the gods of the firmament have obeyed the injunctions of Machito from the day of their creation to the present." ²³

The Thlinkets of British Columbia say that their hero-god, Yehl, opened three mysterious boxes, letting out the sun, moon, and stars. "When he set up the blazing light (the sun) in heaven, the people that saw it were at first afraid. Many hid themselves in the mountains, and in the forests, and even in the water, and were changed into the various kinds of animals that frequent these places." ²⁴

"The Gallinmeros of Central California also recollect the day of darkness and the return of the sun. 'In the beginning, they say, there was no light, but a thick darkness covered all the earth. Man stumbled blindly against man and against the animals, the birds clashed together in the air, and confusion reigned everywhere. The Hawk, happening by chance to fly into the face of the Coyote, there fol-

²³ *Popular Science Monthly*, October, 1879, p. 800.

²⁴ Bancroft, "Native Races," vol. iii, p. 100.

lowed mutual apologies, and afterward a long discussion on the emergency of the situation. Determined to make some effort toward abating the public evil, the two set about a remedy. The Coyote gathered a great heap of tules (rushes), rolled them into a ball, and gave it to the Hawk, together with some pieces of flint. Gathering all together as well as he could, the Hawk flew straight up into the sky, where he struck fire with the flints, lit his ball of reeds, and left it there whirling along all in a fierce red glow, as it continues to the present; for it is the sun. In the same way the moon was made, but as the tules of which it was constructed were rather damp, its light has always been somewhat uncertain and feeble.”²⁵

Naturally, the next stage in these nature-myths sets forth the complete triumph of the sun. Innumerable legends cover this point, from which we select the following: Cacus was a huge giant which inhabited the cave with which we have become so familiar. By profession he was a robber, and, as the records show, he stole certain swift cows, the oxen of Geryon (clouds). His true character is revealed as the falling cloud obscuring belt. It is said that he vomited smoke and flame when Hercules attacked him. The whole scene simply depicts a falling canopy drawing nearer and nearer to the eye of the beholder, and so eclipsing the other sky forms which floated higher up. He stole them away, hid them under his wing, carried them into his cave, etc. Hercules, the conquering sun, dispelled all this gloom, killing Cacus with his unerring arrows (shafts of sun-light), and so releasing the cows or canopy forms, which floated higher up.

The ‘Popul Vuh,’ the book of the Quiches, has a very full description of this whole panorama. The final scene is as follows: “And the sun and the moon and the stars were now all established; that is, they now become visible, moving in their orbits. Yet was not the sun then in the beginning

²⁵ Power’s Pomo MS., Bancroft, “Native Races,” vol. iii, p. 86.

the same as now; his heat wanted force, and he was but as a reflection in a mirror; verily, say the historians, not at all the same sun as that of to-day. Nevertheless, he dried up and warmed the surface of the earth, and answered many good ends."

Artemis (Diana), the silver moon, Apollo's sister, was born at the same time that her brother was. And seven days the sacred swans flew around, encircling the island and the lake seven times. It is recorded also that a sacred light was diffused over the lake—a golden blaze from the holy flaming torch or sun itself. The Oraibi legend introduced the thought of the seven maidens weaving the seven cotton-bolls, and here we have the seven sacred swans guarding the open place, or, as it is called, 'the lake,' and we know also, from the myths quoted, that this lake was in the sky. Hera (Juno) was the jealous spouse of Zeus (Jupiter), and it is recorded that she drove Leto (Latona), the mother canopy, from the twins. Hera, like Pallas Athene, was a goddess of the air, and, to all appearances, the air did drive the vapor shadow away, but before her departure the mother entrusted her children to the care of Themis, whose name signifies 'Justice.' In other words, she placed them under the care of inevitable law.

It was from this spot, where the sacred light of the new born sun was first seen burning, that Prometheus stole fire which he gave to man, a Titan's gift of love caught from the bright sun itself; yet for the act Vulcan chained him to the rock-like canopy, and one of the evil birds connected therewith daily fed upon his liver.

Man, however, in this case was not ungrateful. In honor of his deed, each year they sent a ship to Lemnos to bring back new fire. This ship sailed to Delos to fetch the gift, and meanwhile for nine days all the fires in the country were extinguished, so that they could be rekindled by the new-born flame.

One of the early adventures of Apollo occurred when he was only one year old. Python, a great snake, was coiled in nine folds around Parnassus, where the Muses dwelt. The bright sun killed him with his arrows, but as Juno had created him, this deed only increased her anger against the new-born infant.

Time passed and the 'templum' or wide expanse in the space marked out, the egg-hole or the eye, was cleared. Phœbus Apollo, or the 'golden-haired,' came from the summit of Olympus and dwelt in this creation of his hand, the temple of the sky, the open way, and there as an oracle he spoke to man, telling him of the true astronomy and the way of creation. Following this pattern, man established the Delphic oracle, and many such in imitation of the heavenly.

Connected with the thought that the old sky was a labyrinth, or puzzle, which the clearing away of the 'templum,' or wide expanse, solved to the satisfaction of the early inquirer into the ways of nature, is the great labyrinth which was constructed by Dædalus. It was like the lost sky river, Mæander, for which the Grecian river is named, which flows back on its course, returning to itself. It was a ring or spiral vapor-belt, and Dædalus built it for a certain king named Minos, a sky-king, though called a Creton. Somehow the builder lost the king's esteem, and the evil monarch forthwith imprisoned him in a high tower. From this he escaped, only to find that he could not leave the island, as Minos was keeping a strict watch on all departing vessels. Now, Dædalus said of the king that though he might control the land and sea, yet he could not rule the regions of the crystal air. With that he set himself to fabricate wings for himself and his young son, Icarus, that they might fly away. When these contrivances were finished, he said unto his son: "Now follow me, my Icarus, and you will be quite safe. I warn thee, fly along the middle track; nor low, nor high; if low thy plumes may flag with ocean's spray; if high the sun

may dart his fiery ray.”²⁶ But Icarus, like all the old sky phenomena, fell. It is recorded that he flew overly high, and that the sun melted the wax which attached his wings to his body.

Minos confined in his labyrinth a fearful sky-monster which was reputed to be half a bull and half a man—that is, half a cloud and half a halo. This bloody creature, known as the Minotaur, as the story goes, was fed by his master with human victims. For this purpose Minos made the Athenians furnish him each year with seven youths and seven maids. The poor Athenians submitted to this yearly tribute for a long time, until Theseus, a sky-revolving hero of the vapors, decided to put an end to the infamous practice. He sailed away, promising to return with white sails set in token of victory. Arrived at his journey’s end, he killed the bull and found his way back again through the labyrinthian mists by means of a thread given him by the good Ariadne, the daughter of the old king. This child of Minos was the light, and when once outside the walls of the great sky prison or labyrinth he took her with him. Landing on an isle, he abandoned her, and in doing so made a great mistake. He had promised to return with white sails set, but when he left the light behind, all was darkness. Seeing this blackness while the ship was yet afar, his father, thinking him dead, killed himself.

There is not much difference between the flying ship that conveyed Theseus and the boats that carried Rā and Osiris across Nu-t’s back. Celestial cattle like the bull, Miotaur, are common in the myths of all the ancients. We have already seen how the swift flying vapor-belt was compared to a stag, a hare, and to flying horses. Pegasus was one of this kind. By a turn of speech, we now say of the camel that he is the ‘ship of the desert,’ therefore it does not seem

²⁶ Ovid (Elton’s tr.), slightly altered.

strange, after all, that in the olden time the flying cloud ships were called 'ships of the canopy' or 'racing steeds.'

Pegasus, the winged horse, was one of the most beautiful and bright of these. We can picture him in our minds as he stood with nostril smoking in disdain of man, for, be it remembered, he never allowed any but the gods to ride on his back. Yet because Pallas Athene commanded him so to do, he departed from his custom and allowed Bellerophon to mount. Forthwith they went to battle with the bloody dragon of the fiery tail, known as Chimæra. From her pitchy throat issued flame smoke and sulphurous mist. Pegasus seemed willing to enter this battle for Athene's sake, for these mists were working havoc with her sky. It will be recalled that she was the blue-eyed goddess of the free breeze, the air of heaven itself, and naturally she could not endure this polluting Chimæra any longer. Chimæra was nothing but a vile, fire-breathing lion, dragon, or goat vapor-form, any way. Bellerophon and the bright sun-horse of course conquered her.

Of the ancestry of this horrid creature which we have just seen despatched, Hesiod says:

"And she brought forth another monster, irresistible, nowise like to mortal men or immortal gods, in a hollow cavern; the divine, stubborn-hearted Echidna (half nymph, with dark eyes and fair cheeks; and half, on the other hand, a serpent huge and terrible and vast), speckled, and flesh-devouring, 'neath caves of sacred Earth. For there is her cavern, deep under a hollow rock, afar from immortal gods as well as mortal men: there, I ween, have the gods assigned to her famous mansions to inhabit. But she, the destructive Echidna, was confined in Arima beneath the earth, a nymph immortal, and all her days insensible to age. With her they say that Typhaon associated in love, a terrible and lawless ravisher for the dark-eyed maid. And she, having conceived, bare fierce-hearted children. The dog Orthus first she bare for Geryon, and next, in the second place, she

brought forth the irresistible and ineffable flesh-devourer Cerberus, dog of hell, with brazen voice and fifty heads, a bold and strong beast. Thirdly, again, she gave birth to the Lernæan Hydra, subtle in destruction, whom Juno, white-armed goddess, reared implacably, hating the mighty Hercules. And it Jove's son, Hercules, named of Amphitryon, along with warlike Iolaus, and by the counsels of Pallas the despoiler, slaughtered with ruthless sword. But she (Echidna) bare Chimæra, breathing resistless fire, fierce and huge, fleet-footed as well as strong: this monster had three heads: one indeed of a grim-visaged lion, one of a goat, and another of a serpent, a fierce dragon; in front a lion, a dragon behind, and in the midst a goat; breathing forth the dread strength of burning fire. Her Pegasus slew the brave Bellerophon." ²⁷

²⁷ "The Theogony," 285-325, Bank's tr.

CHAPTER XVIII

HERCULES

HERCULES, like Apollo, was simply another sun deity. The myths being derived from two different sources, thus to one tribe or people the sun was Apollo and to another Hercules. The former people seem to have lived far to the north, where they first saw Apollo and Diana born in the egg-hole land. The latter people seems to have lived to the south, for Hercules was born in the equatorial canopy slit, the two pillars of the canopy extending on either side. Ovid describes the palace of the sun, which he says was "raised high on stately columns, bright with radiant gold and carbuncle that rivaled the flames. Polished ivory chested its highest top, and double folding doors shone with the brightest of silver."¹ The reference to the doors is to the slit in the canopy.

The fact that the myth of Hercules comes from a southern source is also borne out by etymology. The origin of the word Hercules is said to be the Phœnician word 'rakal,' the root 'Ra' being common to the sun-god throughout the east and the south. Ra was the Egyptian god of the sun. Again, in the Hindu legends, Ra-ma, the sun-god, had a terrible fight with Ra-vana, a giant accompanied by the Ra-kshaas or cloud demons, who had stolen away his wife. B-ra-hma the Hindu creator also contains this root in his name.

The Hebrews likewise were once sun-worshipers, as would appear from their names. Thus we find the root 'ra' in Ab-ra-ham, and his father Te-ra-h, and in his wife, Sa-ra-h, or Sa-ra-i. Also in Ra-chel the daughter of Nahor, the brother of Abraham. This root is also found in the name

¹ "The Metamorphoses," bk. ii, fable i.

Ha-ra-n, where Terah died, and in Padan-ra-m, where Jacob dwelt. After the introduction of the worship of the true God, this root was dropped and does not appear again, except in the name of Eph-ra-im, who was an adopted son from Egypt, the land of Miz-ra-im.

The Druids carried the sun worship with them to Ireland, where it is incorporated into the name of the famous hall of Ta-ra.

But to return to the history of our Grecian hero. The adventures of his ancestors also show that the myth of Hercules came from a southern source.

Perseus, who was his great-grandfather, like Osiris was thrust into a chest. But, unlike Osiris, the lad had the company of his good mother, Danaë, who was entombed with him. They were carried by the box to the island of Seriphus, where a fisherman, not unlike Ea, the fish-god of Babylonian and Bel-Dagon ² of the Philistines, rescued them. But though rescued, their troubles were not ended, and the account of these adventures woven together makes one of the most beautiful of the many romances of the vapor-ring which have come down to us from the Greeks.

Briefly, Polydectes, king of the island and brother of Dictys the fisherman, fell in love with Danaë. Resisting this love, she was closed up by the disappointed king in a brazen tower, but as Zeus, the clear-sky, could look in over the top of this tower, he also fell in love, and, changing himself into a shower of pure gold, successfully wooed her with his sunshine.

But let us return to the family tree of Hercules. Perseus had a son whose name was Electryon. Alcmene, daughter of the latter, was the mother of Hercules. Thus we see that he had illustrious annular ancestry. When he was a babe scarcely two months old, he showed his solar character and the blood that was in him by strangling the two serpents or

² "Dag" in Hebrew means "a fish."

pillars between which he was born. It is said correctly that the jealous Juno (Cybele, the Magna Mater of the gods, hence a canopy) sent these harmful snakes into the chamber of the sleeping child, but the awakening sun was equal to the emergency. Defeated in her vengeful deed, Juno then made him subject to Eurystheus, who was the owner of the sky. Thus it came about that to free himself he had to perform twelve labors. He was in subordination to the power of annular and vapor-canopy conditions.

Before considering the labors, it will be well to look between the pillars into the slit or opening where the sun first appeared in the equatorial sky. In the Babylonian Genesis tablets we have an account of this southern slit. It is as follows:

The positions of the gods Bel and Hea he fixed with him,
 And he opened the great gates in the darkness shrouded.
 The fastenings were strong on the left and right.
 In its mass (that is in the canopy) he made a boiling.
 The god Uru (the moon) he caused to rise out of the night he over-
 shadowed,
 To fix it also for the light of the night until the shining of the day.
 That the month might not be broken, and in its amount be regular,
 At the beginning of the month, at the rising of the night,
 His (the sun's) horns are breaking through to shine on the heavens.
 On the seventh day to circle he begins to swell,
 And stretches toward the dawn further,
 When the god Shamas (the sun), in the horizon of heaven, in the east,
 * * * formed beautifully and * * *
 * * * to the orbit Shamas was perfected.³

At this point the tablet becomes illegible; however, the meaning seems plain, the great gods opened the slit or gate in the darkness of the canopy, and through this Shamas, the sun, appeared; his beams in horns at first broke through imperfectly, then he swelled to a circle or halo, but from this on he advanced more rapidly, approaching nearer and

³ "The Fifth Tablet," as translated in Proctor's "Pleasant Ways," p. 393.

nearer to his perfect estate. The movements of the moon were also seen, and once more man was able to count time. In the line that reads, "When the god, Shamas, in the horizon of heaven, in the east," we see that the separating process of the two halves of the canopy has progressed so far that the sun's orbit can be traced continuously through the clearing heavens, all the way from the east, where he had at last appeared on the horizon; that is, they could trace him from the early morning until the sunset.

In the Russian skazaks the same scene is depicted. Many of them tell of a healing and vivifying water. One of the stories is as follows:

"A prince is exposed to various dangers by his sister, who is induced to plot against his life by her demon lover, the Snake. The hero is sent in search of 'a healing and a vivifying water,' preserved between two lofty mountains which cleave closely together, except during 'two or three minutes' of each day. He follows his instructions, rides to a certain spot, and there awaits the hour at which the mountains fly apart. 'Suddenly a terrible hurricane arose, a mighty thunder smote, and the two mountains were torn asunder. Prince Ivan⁴ spurred his heroic steed, flew like a dart between the mountains, dipped two flasks in the waters, and instantly turned back.' He himself escapes safe and sound, but the hind legs of his horse are caught between the closing cliffs and smashed to pieces. The magic waters, of course, soon remedy this temporary inconvenience.

"In a Slovak version of this story, a murderous mother sends her son to two mountains, each of which is cleft open once in every twenty-four hours, the one opening at midday and the other at midnight; the former disclosing the Water of Life, the latter the Water of Death. In a similar story from the Ukraine, mention is made of two springs of healing

⁴Ivan was the sun, as we shall see later in chapter xxi, on the Russian Myths.

and life-giving water, which are guarded by iron-beaked ravens, and the way to which lies between grinding hills. The Fox and the Hare are sent in quest of the magic fluid. The Fox goes and returns in safety, but the Hare, on her way back, is not in time quite to clear the meeting cliffs, and her tail is jammed between them. Since that time hares have had no tails." ⁵

Hercules first appeared in this opening between the snakes, but afterwards, as we have seen, he was made subject to Eurystheus. Under him, his first task was to slay the Nemean Lion of the skies. This cloud-lion was so thick that no solar arrows could penetrate through him, and as he did not live on earth no iron could pierce him. Hercules, after his victory, wore his skin as a trophy. It was a sun-obscuring veil, and, though conquered, was still in evidence. The shirt given him by his wife, Dejanira, was of the same character, but as it fitted more closely its venomous poison is said to have caused his death, the canopy burning as a funeral pile.

The lurid storm-cloud in Finnish poetry is somewhat similar to this conception. It is Ukk's fiery shirt. Again, in Homer, Ino is given by Odysseus a scarf veil, which line of light was afterwards seen issuing from her bright face across the waters; it guided the hero to land.

"Zas, *i.e.*, Zeus," says Pherekydes of Skyros, "makes a

⁵ W. R. S. Ralston, "Russian Fairy Tales and Muscovite Folk-Lore," ch. iv. "Magic and Witchcraft," Afanasyeff, vi, p. 249. For a number of interesting legends, collected from the most distant parts of the world, about grinding mountains and crashing cliffs, etc., see Tylor's "Primitive Culture," pp. 313 ff. After quoting three mythic descriptions found among the Karens, the Algonquins, and the Aztecs, Mr. Tylor remarks, "On the suggestion of this group of solar conceptions and that of Maui's death, we may perhaps explain as derived from a broken-down fancy of solar-myth, that famous episode of Greek legend, where the good ship Argo passed between the Symplégades, those two huge cliffs that opened and closed again with swift and violent collision."

veil large and beautiful, and works on it Earth and Ogēnos, *i.e.*, Okeanos." Ogēn includes here, "the Oversea, and we have again in this the starry *peplos*." "The veil," says Pherekydes, "Zas hangs on a winged oak."

"In the Veda the mothers 'weave a coat for their bright sons'; Penelope plies at her loom upon the web that is never finished, the clouds; and in the Finnish poetry 'the fair virgins of the air, the rich and gorgeous sun, the gentle beaming moon,' 'wove with the golden shuttle and the silver comb.' This, the clouds, was the garment that envelops the dying hero. The death was like the departure of Quetzalcoatl on Mount Orizaba, like that of the hero in Beowulf, who, as the historians say, burnt by the seashore '*wand to wolcum*,'—curled to the clouds." ⁶

A similar myth to that of Hercules, which also begins with wrapping the infant sun up in a lion skin, has been preserved by the North American Indians in the account of 'Tulchuherris' (sun-child), whose name "etymologically," says Curtin, "means a person or thing that has been dug up." ⁷ That is, he was brought forth out of the canopy and was found by an old woman, Pom Pokaila, who immediately "took the buckskin apron (lion skin) from her back, laid it on the ground, put the little boy in it, and wrapped him up carefully."

When found, "the baby's head, as she raised him to the surface, was to the east, his feet to the west; underground his head was to the south, and his feet to the north." ⁸ Taking some liberties with the word 'underground,' we understand the passage as follows: Before he was dug out from under the canopy his light or head was daily seen; first in the south, where naturally the cloud-blanket was first illuminated by the hidden sun shining from the under world,

⁶ Charles De B. Mills, "The Tree of Mythology," pp. 54, 172.

⁷ "Creation Myths of Primitive America," p. 122.

⁸ *Ibid.*, p. 122.

and this light as day advanced spread towards the north (his feet). After he was dug up, of course, he was seen to rise in the east and set in the west (his feet).

Tulchuherris also accomplished certain wonderful labors. We will enumerate thirteen of them. First, he came to a place where there was a great rock standing straight up in front of him in his road. He looked everywhere for a passage, but could see none. He looked on the left side—all was dark; on the right—all was dark. Clearly this is a description of the equatorial canopy split. Many were killed here, the danger being that the rock would sway to and crunch the adventurer. "In one flash," the myth says, "you will be thrown into a dark place, at the side where you cannot see bottom." Tulchuherris kicked the rock over.⁹

In the second labor he wounded a man in the big river.¹⁰ In the third he jumped between the crunching tree, which is another simile for the equatorial opening. The legend says: "When any one was passing, and half-way through the cleft, the pine closed and crushed him."¹¹ Fourth, his dogs killed grizzly bears and rattlers (cloud-forms).¹² Fifth, he killed spiders and smoked with Sas, the old canopy shiner or original sun. Sas could not stand Tulchuherris's pipe; the smoke choked him—a veritable reality.¹³ Sixth, he killed Sas's old woman.¹⁴ Seventh, he dodged knives, *i.e.*, shafts of bright light.¹⁵ In the myths of a great many other lands we have this same scene depicted. The shafts of light being called arrows, swords, etc.

Special reference may be made to the magic sword. "Perseus is armed with it, *harpē*, the gift to him of Hermes, and it slays whatsoever it falls upon. Theseus has it welded of the same metal with the spear of Achilles, the arrows of Phoibos, the good sword Gram, buried to its hilt in the tree

⁹ *Ibid.*, pp. 130, 131.

¹⁰ *Ibid.*, pp. 132, 133.

¹¹ *Ibid.*, p. 134.

¹² *Ibid.*, pp. 135, 136.

¹³ *Ibid.*, pp. 136-138.

¹⁴ *Ibid.*, p. 138.

¹⁵ *Ibid.*, p. 139.

trunk and waiting for Volsung to draw it out; it is Arthur's brand Excalibur, and Roland's Durandal, and the enchanted sword with which Beowulf kills Grendel. And we find it again in the sword Tírfing in the fairy tale. It is the 'Glaive of Light' in the Scotch story, obtained for the giant by the young king Easaidh Ruadh. In the case of Excalibur, the weapon was thrown by command of Arthur about to die, into the lake; a hand and arm were seen to rise from the water, flourish it thrice, and then sink into the lake, where it was seen no more."¹⁶

But it is not necessary to go outside of the Indian legend for illustrations of the bright sun-shafts. Tulchuherris's weapons include a sky spear-pole, a sky spear-head, a sky-strap, a spear-pole, his quiver, and his bow.¹⁷ In connection with the quiver Curtin says:

"In Indian myths from New York to California the porcupine is ever connected with light; in some cases it is the sun himself. In 'Tulchuherris' * * * Sas (the sun) carries a porcupine quiver, and is advised never to lay it aside, for as long as he keeps it on his shoulder he is safe from his children, the grizzlies, (the clouds), who wish to kill him."¹⁸

In the eighth labor Tulchuherris escaped from the sweat-house. "I swim in the river every morning. We will sweat, and then swim," said Sas.¹⁹ Ninth: He killed more rattlers ('pets') in a tree. After this act he got down from the tree by using a 'sky-strap.' In the legend the scene is depicted as follows:

"Tulchuherris stretched his hand toward the west, where his grandmother was, and immediately something came with a whirr and a flutter, and settled on his arm like a bird. It was a sky-strap, blue like the sky, narrow and very strong.

¹⁶ Charles De B. Mills, "The Tree of Mythology," pp. 162-163.

¹⁷ "Creation Myths of Primitive America," p. 28.

¹⁸ *Ibid.*, p. 500. ¹⁹ *Ibid.*, p. 139.

He fastened one end of it to the limb, knotting it in such a way that he could untie it with a jerk at the other end. He slipped down on it, and when on the ground jerked it loose. He strung the snakes on the long bone, they were all dead, and carried them to Sas's house."²⁰

Tenth: He killed grizzly bears (clouds) in a narrow pass, which may be identified with the canopy slit.²¹ Eleventh: He killed bears (clouds) and snakes (vapor-belts or annular ultra atmospheric arcs) at a spring, evidently located in the sky land. All these doings seem to be associated with water, but as water did not exist in the sky except as vapor belts at great altitudes, held in suspension under the canopy, and also as at present in the form of ordinary clouds, it follows that the appearance alone is the real reason why the ancients believed that they were covered by a firmament of water. In this labor Tulchuherris opened the spring, bringing forth a clear, cold stream.²²

Twelfth: He killed Supchit, Sas's son, who was a fish like Ea, of the Babylonian pantheon. "'Very well,' answered Tulchuherris, who put his foot on the end of the bridge and crossed with one spring. On the other side he went to the fishing-hut, fixed so that a man could look up and down the river while fishing. Tulchuherris had his own spear-shaft, a sky-pole; the string was a sky-strap. He had his own point, too. He waited for fish, and at last saw something come slowly from the south." * * * "I am sorry for you, my brother-in-law," said Tulchuherris. "I hate to kill you, but I must, for my father-in-law sent me to kill you."²³ Like Hercules, Tulchuherris had to obey his master, so he speared Supchit.

Thirteenth: He played with the springing tree and divided old Sas, the false and vain (canopy shiner) chief of Saskewil, into his present form of sun and moon.²⁴

²⁰ *Ibid.*, pp. 142-145.

²¹ *Ibid.*, 145-146.

²² *Ibid.*, p. 148.

²³ *Ibid.*, p. 150.

²⁴ *Ibid.*, pp. 152-157.

Another legend which resembles the Hercules myth is found amongst the Yamas. It is entitled, "The Dream of Juiwaiyu, and His Journey to Damhauja's Country,"²⁵ but we cannot take the space for its proper analysis.

It is wonderful how many details of canopy-decline our Amerinds have retained. These same Yamas tell us in the myth of "The Winning of Halai Auna" that "the great sweat-house of the sun is the dome of heaven." It is a description of the canopy drifting slowly northwards, and again, had we space, its analysis would be very profitable. In this legend says Curtin: "The shooting of Wakara into the sky is a curious variant of the tree-bending by Tulchuherris and Sas in the Wintu myth."²⁶

Returning to the myth of our Grecian Hero, we find that in his second labor he had to fight against the Hydra, the many-headed serpent of the clouds. This monster was the offspring of Typhon and Echidna, with whom we have already become acquainted.²⁷ The fight began by Hercules cutting off the heads of some of these serpents, but he soon found that for every head cut off two fresh heads started up, and to increase his difficulties a huge crab (emblem of the backward motion of the canopy) fastened on his heel. Changing his form of attack, Hercules now took sun-fire with which he seared each head as he cut it off, thus preventing its regrowth. When he came to the last head he found it invulnerable (our present storm clouds cannot be conquered), so he took this last head and cast it down from

²⁵ *Ibid.*, p. 425 ff. ²⁶ *Ibid.*, p. 520.

²⁷ It will be remembered that Echidna was not only the reputed mother of the Hydra, but also of Chimera, and of the many-headed dog Orthos, of the three hundred-headed dragon, of the Hesperides, of the Colchian dragon, of the Sphinx, of Cerberus, of Scylla, of the Gorgons, of the vulture that gnawed away the liver of Prometheus, and of the Nemean lion; in fact, the mother of all adversity and tribulation. In one word, she was the canopy, and, like Ishtar of Chaldea, was the mother of all evil.

its high position, burying it under a rock by the road-side, whence it waters all the regions of the earth.

This last storm-head is vividly pictured by the Shoshone Indians, who conceive the domed firmament to be ice: "It has the color of ice,—and from time to time, as they have it, a monster serpent-god coils his immense back up against the firmament, and with his scales scratches and wears off its face. The ice-dust that falls we see in the winter as snow; in the summer season, melting during its descent, it comes as rain."²⁸ It was natural for the succeeding generations to attempt to find the old canopy scenes still in the sky, for all their legends told them so plainly of the past.

Our heroes' third labor was to bring back alive a certain wild boar. The furrowed sky was called in those times a boar. In the Hindu legend we read of a similar exploit. Rama, the sun-god, lost his wife, whose name was Sita, which signifies 'a furrow.' The demon who stole her away bore her struggling through the air.²⁹ Hercules in the same manner carried his boar to Eurystheus, the master of the sky (and his master also), but the wild nature of the thing so alarmed him that he, the timid Eurystheus, hid himself behind the brazen clouds. Some say he placed himself inside a large bronze vessel. This brazen receptacle of the canopy was also called a hogshead. In the case where Danaë was shut up by her father, it was called a tower of brass. Into this hogshead Hercules then threw the porcus plowed land of celestial scenes.

²⁸ Charles De B. Mills, "The Tree of Mythology," p. 23.

²⁹ The battle was a terrible one. The details show clearly that the legend is derived from the same source as the Hercules myth. It is the battle of our Grecian hero with Hydra over again. The terrible monster's name who thus stole Sita away was Ravana. He had ten heads, and as fast as Rama, the sun-god, cut them off, another grew in its place. Finally it was necessary to consume his body by fire, and Sita, the furrowed sky, had to undergo this ordeal also, but she came out of it purified and redeemed from all taint.

On his way back from this labor a story is told of how he visited a Centaur named Pholus. While they were dining in his cave home the strong aroma of the wine attracted the other Centaurs, who forthwith collected together and offered Hercules battle. Their mothers, who are plainly called the clouds, helped them by sending a flood of water.³⁰

In the fourth labor the stag which belonged to Diana, vapor-moon, goddess of the silver-crescent ring,³¹ was chased for one whole year by our hero. The stag who was 'fleet of foot' was the hurried skies, and yet he was tamed and in the end brought into subjection by Hercules, who, like Œdipus, was 'slow of foot.'

In the next labor the Stymphalides birds were driven away by sun-darts. Their character as vapor monsters of the sky is shown by the statement that "their great wide wings

³⁰ Hellas has two versions of a flood, one associated with Ogyges, the other, of a far more elaborate form, with Deucalion. This latter name is only another name for Noah. Jupiter summoned the gods to council and told them that he had resolved to drown the earth. "The north wind, which scatters the clouds, was chained up; the south was sent out, and soon covered all the face of heaven with a cloak of pitchy darkness." * * * "Jupiter, not satisfied with his own waters, calls on his brother Neptune to aid him with his. He lets loose the rivers, and pours them over the land. At the same time he heaves the land with an earthquake, and brings in the reflux of the ocean over the shores." (Bulfinch, "The Age of Fable," tr., Scott, pp. 24-25.) This all recalls to mind the secondary causes mentioned in our scientific chapters. The story goes on to say that this flood swept away the whole human race except one pair, Deucalion and Pyrrha, who, as the waters abated, landed on Mount Parnassus.

It is interesting to note that in India also there are accounts of two different floods. "In the Varâha, or third avatar, Vishnu appeared as a boar to save the earth when it had been drowned a second time. The boar went into the sea and fished the earth out on his tusks." (Murray, "Manual of Mythology," 20th ed., p. 380.)

³¹ Originally the moon, so-called, was a crescent form of the canopy. After the precipitation of the vapor the only crescent form left in the sky was our satellite.

stretched across the heavens and obscured the sun." When the cloud winds blew every line became a flying spear—sundarts.

The sixth labor describes the clearing out of the Augean Stables. Augeus means "a being of pure streaming light." At one time the canopy was the only source of light; it was known to the ancients as the sun and at night was their moon. The cattle were clouds. To clean out their stable Hercules simply opened the wall of the canopy (stable) and let a rushing sky-stream flow through which quickly washed away the filth, dark clouds and all.

Hesiod says: "Poseidon (Neptune) was a bull," and we have found out that bulls were guardians or haloes accompanying the glowing sun. In the seventh labor Hercules was required to bring the Cretan Bull bound into Mycenae. He forced the beast, who was the offspring of Neptune, to leave the herd of celestial cattle sacred to Helios (Sol), and then made it swim across the canopy, the great sea of waters; thus he performed his task. The eighth labor was similar: our hero conquered the swift horses of Diomedes, which were fleeting vapors of the canopy.

Terrific grandeur and destructive power
Marked their career as rushing on they went,
Fire breathing, plunging, dashing, snorting loud—
The soul of the great deep was in their might,
As sound of many waters, hoof on hoof.

The ninth task was to procure the girdle of Hippolyta, Queen of the Amazons. This girdle was a present from Ares (Mars), god of war and of the storm. Eurystheus, owner of the sky, wanted it for his daughter, Admeta. No doubt he thought she would look very fine girdled with the world-ring or, as it is often called, 'the serpent coil of cloud.' She was the goddess of the lower air, and when Hercules brought it to her she put it on and has worn it ever since, signifying that the storm-fiend had descended into the lower regions, where now the tempest raves.

Admeta or the deadly shade has passed—
The girdles gone, and yet it still remains,
For, like the Hydra's one immortal head,
It waters, yea, still waters, all the earth.

To conquer the flesh-eating oxen (clouds) of Geryon, Eurystheus sent our hero to the Western Isle. This locality is the cave-hole of northern mythology, the egg-hole, the place of the one eye, the Cyclops, etc. The mighty and brave Hercules took a ship (halo-boat) in order to reach this far-off region, as he had to pass back of the great belt that encircled the middle regions of the earth. When he arrived at his destination he fought against the owner of the strong black cattle with his fire, and it is recorded that a sun-shaft finally killed him. On his way home a gadfly caused his cattle to scatter in the great cloud mountains of the canopy (the great middle belt). Zeus was the clear-sky, and the record says they ran to him.

In the eleventh labor we have another adventure connected with the egg-hole land of the north. Here the golden apples of the Hesperides were seen to glitter on the world-tree. These were the stars seen in their purity in the blue sky. This incident is no doubt derived from the same phenomena as those which gave rise to the Babylonian myth. In the Ninth Tablet of Gilgamesh, that hero is represented as going on a long journey to see his ancestor, Tsīt-napishtim. It was a very difficult excursion, and he was forced at one time to march onwards for the space of twenty-four hours through a region of thick darkness, which we understand as portraying a country darkened by a falling vapor-belt (the great middle belt, that is, of middle latitudes). But at the end of this long, dreadful journey he came out once more into the light of the sun, and, behold, there was a beautiful tree, the top of which was *lapis lazuli*, and it was laden with fruit which dazzled the eye.

These stars are connected with a great many myths. Ignatius Donnelly says: "This is the same legend which

we see appearing in so many places and in so many forms. The apple of Paradise was one of the apples of the Greek legends, intrusted to the Hesperides, but which they could not resist the temptation to pluck and eat. The serpent Ladon watched the tree.

"It was one of the apples of Idun, in the Norse legends, the wife of Brage, the god of poetry and eloquence. She keeps them in a box, and when the gods feel the approach of old age they have only to taste them and become young again. Loke, the evil-one, the Norse devil, tempted Idun to come into a forest with her apples, to compare them with some others, whereupon a giant called Thjasse, in the appearance of an enormous eagle, flew down, seized Idun and her apples, and carried them away, like Ravana, into the air. The gods compelled Loke to bring her back, for they were the apples of the tree of life to them; without them they were perishing. Loke stole Idun from Thjasse, changed her into a nut, and fled with her, pursued by Thjasse. The gods kindled a great fire, the eagle plumage of Thjasse caught the flames, he fell to the earth, and was slain by the gods."³²

But the consideration of these legends is leading us away from the eleventh labor. Eurystheus demanded that our hero should procure these apples (stars) for him. Before Hercules could accomplish this feat he found it necessary to kill a great dragon snake which guarded the tree whereon the apples grew. Some say that Atlas plucked the fruit for him while he upheld the great hill of the middle canopy. However this may be, when the apples were procured Hercules presented them to his master, the first fruits from the great real world beyond.

The twelfth and last labor was to bring from Hades (which, it will be remembered, is located in the canopy) Cerberus, the three-headed dog, with the tail of a serpent and with bristling snakes round his neck. This description

³² "Ragnarok," p. 324.

shows what manner of sky-dog he was. As he brought this monster forth, the shades of darkness fled in terror, nevertheless Hercules kept straight on through a chasm which he rent right through the canopy. This done and all vapor-forms conquered, of course our hero, the sun, came forth free from the enthralling belts. It is recorded that he joined the Argonauts and sailed in their ship, the Argo, which was a vapor-arc, arch or ark. He brought back with him the golden fleece, the bright sunshine like sky-gem, and was free indeed. And yet the story of his captivity has lived on down through the ages.

In Persian literature the great hero Rustam accomplishes the same series of victories that marked the career of Hercules. Poor says of him :

“He is a compound of Herakles the Greek and Roland of the Middle Ages, as we shall see later. His infancy is protected by a marvelous bird—the Simurgh. He is like the bird Garuda in Sanskrit, and develops into the roc of the Arabian Nights. When an infant only he performs prodigies of valor, like Herakles; when a child, he kills an elephant. When grown up, the king and his army being shut up in the demon country by the king of Turan and his Divs, Rustam, all alone, performs seven labors and frees the king. This is again like Herakles. But Rustam is as pious as he is brave. He prays to his god before every encounter, and gives thanks after every victory. He has a marvelous horse, whom he loves more than wife or child. These traits suggest Roland. He is, in fact, a perfect type of the mediæval hero, except in one thing, his indifference to women: he leaves his young wife, the daughter of a king, to look for his horse, which had strayed away, and never goes back to her, although he kindly sends once to inquire for her. Now, many of these traits identify him at once as a solar myth. If he is so much more pious than the Greek hero, it is that he expresses the simple faith of the noble Persian character. His marvelous strength

when an infant is the power of the sun, resistless even at its rising; the seven labors which he performs for the good of others, the demons which he slays, are the dark clouds which obstruct his path. When in the middle of his life, Rustam feels that his labors for others have not been appreciated, and he sits apart, gloomy and sullen, in his tent, while the war goes on. This will at once suggest the wrath of Achilles. It is the dark cloud again obscuring the beneficent sun."

* * * "And at last, when Rustam dies, he is not killed in fair fight, but in ambush—like Siegfried, slain from behind." ³³

Poor goes on to say: "There is another hero in the Shah Nameh, named Isfendiyar—also a solar myth, because he can be slain only by an arrow from a particular tree, the thorn; this is the same thorn which killed Siegfried in German, the mistletoe which killed Balder in Norse, the thorn which pricks the sleeping beauty." ³⁴

It is interesting to see how the legend of Roland has been handed down to the Middle Ages. It illustrates the process by which these myths have survived and been embellished up to our own time. Poor tells us that:

"Roland has the characteristics of the solar myth. True, he may have really lived; but no real man, no real weapon, could ever have performed the prodigies of valor which Roland and his good sword did. The sword, too, was brought to him in a miraculous way. It is not the pagan way in which Perseus and Sigurd got their swords. It is the Christian way, which performed all the other miracles of the Middle Ages. And the Song of Roland is so delightful because it has this new tone, and because it sustains this tone so perfectly throughout; all the prodigies are impressed with it. Still, they are prodigies, not natural acts. No hero could, single-handed, kill four hundred men at a stroke,

³³ "Sanskrit and its Kindred Literatures," pp. 159-160.

³⁴ *Ibid.*, p. 161.

after his skull was split open. But if you look at Roland as a solar hero, the work would be easy indeed for the irresistible power of the sun. Roland's death, too, is supernatural. He has not one scratch on his body, though his armor is pierced with a thousand darts. His skull splits open from excessive toil; his brains ooze slowly out. With his death his sword must go too. No other can wield it. With the death of the sun, its rays no longer shoot across the sky." ³⁵

We will be pardoned if we again quote from Poor. Our author says: "Another hero of the Charlemagne cycle is Olger the Dane, the national hero of Denmark; and he represents many other features of the solar myth." * * * "Olger grows up beautiful and strong, but is sent as a hostage to the court of Charlemagne. Here he labors for others, like the other solar heroes, and fights for beings meaner than himself." * * * "A Saracen giant appears, and Olger kills him. Then the emperor does him a wrong; and his anger, like the wrath of Achilles and Rustam, makes itself felt. He goes out into the world as a wanderer, and travels far and wide, like Odysseus. Finally, he longs to see his land again, and sets sail; but the ship is wrecked. The waves bear him to a strange land, where a stately palace stands; this like the palace on Kirke's isle. At morning he finds a flowery vale; and Morgan le Fay comes to him, and welcomes him to Avalon, and takes him to the palace, where he finds Arthur healed of his wound. Then Morgan gives him a wreath of forgetfulness for his forehead, and an enchanted ring for his hand; while he wears these, he never grows old. By and by the wreath slips from his forehead, and he remembers Charlemagne, and longs to go back and fight the Saracen. So he reappears, like Rip Van Winkle. That is, the sun comes back, after being carried away by the

³⁵ *Ibid.*, pp. 356-357.

darkness. Morgan le Fay had given him a torch, which is the measure of his days, like the firebrand of Meleagros in Greek. While it burns, he can never die. He fights as bravely as before, though the world has changed; for hundreds of years have gone by while he was gone in Avalon. When he is about to wed the Empress of France, Morgan le Fay appears and bears him away. But the torch is still burning in an abbey crypt, and therefore he is expected to return; like Sebastian of Portugal, and Frederick Barbarossa, and Arthur of Brittany. When Denmark is in danger, then the Danish peasants are sure that Holger Danske will return.

“This is substantially the story told in Germany, later, of Tannhäuser. Venus carries him away into the middle of a hill, called Hörselberg. There he lives in forgetfulness; but he longs at length to return to a life of virtue, and goes out of the hill. He meets a priest and confesses his sin; but the horror-stricken priest tells him that his own oaken staff may as soon bud and blossom into roses as his sin be absolved. So the poor Tannhäuser goes back to the enchantress. Eight days after, the staff does bud and blossom into roses; and all the people expect Tannhäuser to reappear.”³⁶

It is interesting to note what Poor has to say about Arthur, so we select the following:

“Arthur, the Christian knight, the blameless king, was first a Keltic hero, sung by the Druid bards. Shall I say more, or is it already guessed that Arthur, like so many other Aryan heroes, is only the sun and its course personified in a human form? It is beyond doubt that Arthur lived, a date is even fixed for him at 542; but the mind of his race could not invent new facts about him. Those very circumstances which happen to each Aryan hero fasten themselves upon him, with a monotony which would become wearisome had

³⁶ *Ibid.*, pp. 357-359.

it not a great principle lying underneath it. Certainly, if the Kelts had imagined a hero, they would have found some new thing for him to do. That they did not proves that they simply formulated the thoughts which lie dormant in each branch of the race, brought from its home." * * *

"We will therefore separate Arthur from the knights who surround him, and look at his story. His birth was supernatural: as soon as he was born he was wrapped in gold-colored glittering raiment, and taken away from his mother." * * *

The supernatural manner in which he procured his bright sun-shaft sword was as follows: "The lords came into a church-yard, and there stood an anvil of stone, and stuck therein a fair sword, naked at the point, and letters of gold were written about the stone, that said: "Whoso pulleth out this sword out of this stone and anvil is rightwise born king of England.' All the great lords try, but of course none can pull out the sword but Arthur. This is exactly the story of the sword in the Volsung Saga, and somewhat like that of the sword of Theseus in Greek. The beard and hair of Arthur shine like gold, and the nobles are forced to make the beautiful youth their king. Then enemies attack the land, but Arthur draws the 'sword that flashed in the eyes of his enemies like thirty torches,' and kills them all. Finally, in battle, this sword snaps, like the sword in the Volsung Saga. Then a maiden out of the water, like Thetis in Greek, like Hiordis in Norse, brings him another sword. While she keeps the scabbard, his life is safe; he can neither bleed nor die; Arthur thus becomes another of the invulnerable heroes. He has miraculous powers over nature; an owl, a blackbird, and a stag talk to him, and do his bidding; these are the same talking animals which we meet in other Aryan literatures." * * *

"Merlin warns him that he will be destroyed by his sister's son, who will be born on May-day; and he orders all

the children born on May-day to be drowned. But Mordred escapes, and grows up to kill his father. This brings Arthur still more closely within the mythical framework." * * *

It is the old story of the sun marrying the canopy—of one canopy-light day or period destroying the day which preceded it; and shows "very clearly that Arthur was a pagan demigod before he became a Christian king." * * *

Arthur, according to the tale, weds. "The invading kings ravage the land again, scarce one month after Arthur is married: and he cries out like the wanderer, 'Never have I had one month's rest since I became king of the land.' So Arthur's life goes on in fighting; finally Lancelot plays the part of Paris in the Iliad. He makes Gwennivar untrue to her husband, and a last great battle comes between the forces of the two. Here the myth brings in the snake. There was to be no fighting until a sword should be raised; but a snake bit one of the knights; he raised his sword to slay it, and the two armies, supposing it to be the signal, came to battle. His son, the traitor Sir Mordred, wounded the bright king, because the scabbard of his sword had been stolen. Yet Arthur cannot die till the sword has been thrown into the water, for the sun must set in the waters (behind the canopy-bank). But Arthur is one of those heroes who do not die. The three mystic queens, like the three fates or three furies, bear him away in the ship of the dead (the canopy ship), but he will return. All Wales and Brittany look for his coming. He has only gone to the land of Avalon to be healed of his grievous wound. Now, the word Avalon means the island of apple-trees. The paradise of the Kelts was always an island far over the blue seas." ³⁷ The fact will be recognized that he went to the egg-hole land, and that the apples are the stars in the open place of the sky where he was to be healed.

³⁷ *Ibid.*, pp. 245-248.

CHAPTER XIX

PLATO'S CONTRIBUTION

THE Platonic Drama consists mainly of argumentative conversation, however the element of the myth is frequently introduced, and in some of the Dialogues it becomes so striking that a just consideration of Plato's philosophical style is impossible without taking it into account. To understand this philosophy in its fullness, then, it is all-important to catch the true notes of the echo from the forgotten past. The Belted Canopy Hypothesis does this; it brings the vibrations of the past down to the present. Let us make a connection with this long-distance telephone and place our ear at the receiver.

Here and there we catch a sound that seems to have pierced right through the whole gap of history. The Phædo Myth vibrates with the rush of many waters. Channels are bored under the Earth, forming bowls, and measureless floods of perennial rivers, some broad, some shallower, also much fire floweth, and there are great rivers of fire (rivers illuminated by sun-fire), and many rivers of running mud, some clearer, some thicker. Plato naturally compares them to the rivers of Sicily. Then note the significant language that follows: "With these floods therefore each place is filled according as at each time the stream floweth round unto each." The ebb and the flow of the tides resounds through the whole passage, but the beat of the waves still has the sound of the storm of canopy decline. And they flow 'afar off, where deepest underground the Pit is digged' (the Tartarus of the poets). Now, from this cavern the rivers

¹The translation quoted in the text is from J. A. Stewart's "The Myths of Plato."

flow in, and from it they flow out. "The cause of all streams flowing out and flowing in is that this flood hath no bottom or foundation. Wherefore it swingeth and surgeth up and down, and the air and the wind surge with it." "Some waters there be that, coming forth out of the Earth at one side thereof, flow in at the contrary side; and some that go in and come out on the same side; and some there be that go round the whole Earth and are wound about it once—yea, perchance, many times—like serpents. These rivers pour their waters back into Tartarus as low down as water can fall. Now, it can fall as far as the centre in each way, but no further: each half of the Earth is a hill against the stream that floweth from the side of the other half." The four rivers are called 'Ocean,' 'Acheron,' which floweth the contrary way (a very significant statement, as the canopy belts, owing to their different positions in the heavens, appeared to flow or move at different rates of speed; to an observer in the south the belts in the north must have even appeared to have a retrograde movement), Pyriphlegethon of the fiery floods, and the Styx, whose waters hath wholly the color of blue steel, and which issues forth first into a fearful, savage place.

Another sound comes over the 'phone' from the Myth of Er. Here we have the Spindle of Necessity, a pillar of light in the sky. The souls after sojourning a thousand years in Tartarus and Heaven journey aboveground from the Meadow till they come to a "Rainbow-colored light, straight like a pillar, extended from on high throughout the Heaven and the Earth." There seems to be a great system revolving above, and the Earth remains fixed in the centre. The destination of the Pilgrim Souls appears to be that part of the surface of the globe which supports the hemisphere of fire, and the Spindle of Necessity. "Now, when both companies had been seven days in the Meadow, Er said that they were constrained on the eighth day to arise and journey thence,

and came on the fourth day to a place whence they could behold a Straight Light extended from above through the whole Heaven and Earth, as it were a pillar, for color most like unto the rainbow, but brighter and purer. Unto which they came when they had gone forward a day's journey, and there, at the middle part of the Light, beheld extended from the Heaven the ends of the bonds thereof; for this Light is that which bindeth the Heavens together; as the under-girths hold together ships, so doth it hold together the whole round of Heaven; and from the ends extendeth the Spindle of Necessity, which causeth all the heavenly revolutions, whereof the shaft and hook are of adamant, and the whorl is of adamant and of other substances therewith."

"Now, the whorl is after this fashion. In shape it is as one of our whorls, but from what he said we must conceive of it as a great whorl, carved hollow through and through, wherein is set, fitting it, a smaller whorl of like kind, as caskets are set fitting into one another; and then in this a third whorl is set, and then a fourth, and then four others; for the whorls are together eight, set one within another, showing their lips as circles above. * * * And the whole spindle goeth round in the lap of Necessity." The whole matter resolves itself into a natural law.

Still another vibration comes down the thread of time from the Politicus Myth. The cosmic periods, come, and the cosmic periods go. When the controlling agency of some all powerful sky-god lets go the helm, then the Cosmos begins of itself to revolve backwards. The Golden Age of Cronus was brought about by a good god, an all-protecting canopy, under which the children of men basked in security and plenty. But when this god was dethroned, the Cosmos changed the direction of its revolution, the change being accompanied by great earthquakes, which destroyed all but a few men and animals. This was no doubt the ending of the cataclysm which is known to science as the Ice age. Then

the Cosmos calmed down, but it is said that it revolved in its own direction, which evidently means that it did not revolve with the same movement that it did under the good god Cronus. It went from bad to worse, till the god of the great expanse of heaven, in his goodness, saved struggling men by means of the fire of Prometheus. Zeus triumphant let the light of the new-born sun shine in on the darkened earth.

The doctrine of periodical terrestrial 'catastrophies,' as set forth in this myth, was a part of the 'science' and 'philosophy' of Plato's day. The reason for this bent of mind is accounted for by the closer association of his age with that which went before, but it must be kept constantly in view that when Plato lived he only caught, as we do, these echoes from a distance; the distance of course was measurably shorter, but the interpretation of the vibrations was in some ways more difficult than it is with us, owing to the fact that his general knowledge was much more limited than ours of to-day. Thus in the Myth of the Golden Age he puts into the mouth of the Athenian Stranger these words: "It is told that there was a Government and Settlement when Cronus was King; whereof the blessedness was great." Plato goes on to state that "this, then, is the tale which we have received concerning the blessed life of the men who lived in those days: It telleth that they had all things, without stint, spontaneously."

Let us hear more of what this Stranger has to say; he is speaking in the Politicus Myth. "Hearken! This Universe, for a certain space of time, God himself doth help to guide and propel in the circular motion thereof; and then, when the cycles of the time appointed unto it have accomplished their measure, he letteth it go. Then doth it begin to go round in the contrary direction, of itself, being a living creature which hath gotten understanding from him who fashioned it in the beginning. This circuit in the contrary

direction belongeth of necessity to the nature of the Universe. Now, that which we call Heaven and Universe hath been made, through him who begat it, partaker of many blessed possessions. * * * Whereof it is not possible that it should be wholly set free from change, albeit, as far as possible, it revolveth in the same place, with one uniform motion: for this reason, when it changed, it took unto itself circular motion in the contrary direction, which is the smallest possible alteration of the motion which belongeth unto it." Then follows a philosophical deduction that shows how this condition of the heavens naturally gave rise to the supposition that there was more than one god. In Plato's time the true significance was already lost, so the Stranger did not think the argument in favor of there being two gods was strong. The philosophical remarks are as follows: "From all this it followeth that we must not say that the Universe either of itself moveth itself alway, or again is alway wholly moved by God to revolve now in one direction and then in the contrary direction; nor must we say that there be two Gods which, being contrariously minded, do cause it so to revolve; but we must hold by that which was just now said and alone remaineth, to wit, that at one time it is holpen and guided by the power of God supervening, and hath more life added unto it, and receiveth immortality from the Creator afresh; and then, at another time, when it is let go, it moveth of itself, having been so opportunely released that thereafter it journeyeth in the contrary direction throughout ages innumerable, being so great of bulk, and so evenly balanced, and turned on so fine a point." "Now have I told thee, Socrates, of the life which was when Cronus reigned; as for the life which now is, which they say is under the rule of Zeus, thou art here thyself and knowest what it is."

The subject of the *Timæus* Myth is the Creation of the Universe. Over the 'phone' comes the question: "Have we rightly called the Heaven One? Or were it more right to

say that there are Heavens many—nay, infinite in number? ” The discussion goes on to prove that there is only one. But why was the question asked? In Plato’s time, just as in our own time, sane men knew there was only one Heaven. Were there ever conditions that gave rise to this question, or were Plato’s ancestors insane?

The Atlantis Myth is perhaps the most germane to the present hypothesis of any of the Platonic Myths. It is recorded in the *Critias*, which, though it is only a fragment, is a very bulky fragment of the *Timæus* Myth. It is so long and so well known that we omit it. Another version of the story is given by Theopompos, who wrote in the fourth century before Christ. According to him, the information concerning Atlantis was given by Silenus to the ancient king of Midas.²

Herodotus mentions the matter and in connection with the cloud-mountain he says:

“The inhabitants say that it is the Pillar of Heaven. From this mountain these men derive their appellation, for they are called Atlantes. They are said neither to eat the flesh of any animal nor to see visions. As far, then, as these Atlantes, I am able to mention the names of the nations that inhabit this ridge, but not beyond them. This ridge, however, extends as far as the pillars of Hercules.”³

But to return to the Platonic exposition. The shape given to the Living Creature, our Earth, as described in the *Timæus* Myth, makes it appear “like a ball, round with boundary at every point equally distant from the centre.” And furthermore, there was nothing outside this boundary or canopy, because man in the early ages could not see beyond it. “Wherefore He turned it round and round, with the

² See Aristotle, cited by Plutarch, *Consolatio ad Apollonium*, § 27, ed. Didot-Dübner, p. 137. Compare Preller, *Griechische Mythologie*, 1st ed., vol. i, p. 453.

³ B. iv, c. 184, Cary’s tr.

same quickness, in the same place, about itself." At this point in the myth the idea of a later age intrudes itself upon the circular motion. When the canopies fell the true heaven was revealed, but the idea of circular motion was retained; however, to fit it to the new conditions, it was subdivided into the seven concentric circles, representing the seven planets, the fire-ring and the *primum mobile*.

Of Earth and Heaven, the myth goes on to say, the various gods were born—"both gods visible in their heavenly courses, and gods which make themselves visible as it pleaseth them—then spake unto them the Begetter of this Universe, saying: Gods of gods whose Maker and Father I am, ye are the creatures of my handiwork, and without me are ye not loosed asunder, for verily that which is bound together can always be loosed; but none save an evil one would desire to loose asunder that whereof the parts are well joined together and the whole state is goodly. Wherefore, being creatures, ye are not altogether set apart from death so that ye cannot be loosed asunder." Then follows a description of the creation of soul, and a mixed idea that the Immortal partakes of the nature of the Universe.

"Now, the circuits of the Soul, having been bound within the River of the Body which floweth mightily, neither had the mastery over it, nor were they mastered, but were pushed about, and did push with violence, so that the whole creature was moved, and went hither and thither disorderly, by chance, without forethought, having all the six motions; for forward and backward, and to the right and to the left, and down and up, did the creatures go, wandering towards all the six points; because that the flood was great which did swell up over them, supplying their nourishment, and then again did flow away from them; and yet greater was the commotion that was made in them by the blows of those things which did strike against them."

"The Young Gods, taking for a pattern the shape of the

Universe which is a globe, bound the Divine Circles, which are twain, within this corporeal ball which we call Head. * * * For they perceived that unto the Head belonged all the motions which should be. Wherefore, that it might not go rolling upon the earth, which hath heights and depths of every sort, finding no way of getting over those or out of these, to this end gave they unto it the Body for a carriage, to make the way easy for it. Wherefore the Body got length, and put forth limbs which were able to be stretched out and to be bent, four in number; for thus the Gods devise means of going about, so that the Body, therewith taking hold and pushing off, could go through all places, bearing aloft the temple of that which in use is the most divine and the most holy."

This same comparison of the soul to the old-time canopy, the universe, which was known of yore, occurs in the Phædrus Myth.⁴ "Let it then be said of the Soul, that she is like unto a Power composite of two Winged Horses harnessed, and a Charioteer. All the Horses and Charioteers of the Gods are themselves good, and of good stock." The chariots of the gods were the vapor shells or halos (in mythology these are often called boats) which accompanied the sun, moon, and stars in their courses.

The myth goes on to state that "the nature of wings consisteth in the power of lifting that which is heavy up into the height where the generation of the Gods dwelleth; and unto wings, amongst the bodily parts belongeth the largest portion of that which is of God.

"Zeus, the great Captain of the Host of Heaven, mounted upon his winged chariot, rideth first and disposeth and over-

⁴"There can be no doubt, I think," says J. A. Stewart in his observations on the Phædo Myth ("The Myths of Plato," p. 107), that the lofty terrestrial Paradise of the Phædo Myth answers to the 'Island of the Blessed' in the Gorgian Myth, to (these) heights of the Phædrus Myth, and to the 'heaven' of the Myth of Er." Dante's Mount of Purgatory is founded on the same echo.

seeth all things. Him followeth the army of Gods and Daemons in eleven orders—for Hestia alone abideth in the House of Gods; but all the other Gods which are of the number of the Twelve go forth and lead each one the order whereof he is appointed to be captain.

“Many holy sights there be for eye to behold of blessed Gods in their courses passing to and fro within the firmament of Heaven, each one doing his own business: and whosoever willeth, and is able, followeth; for Envy standeth afar from the Heavenly Choir.

“Now, as often as they go to eat at the banquet, their path is ever up by the steep way close under the roof of the Heaven. The Chariots of the Gods, going evenly and being alway obedient to the hand of the Charioteer, accomplish their journey easily; but the other Chariots hardly, with great labor, for the Horse, which is by nature froward, is as a weight, and ever inclineth towards the Earth, and, except the Charioteer hath brought him into subjection, draweth the Chariot down. * * * The Souls which are called immortal, when they are come to the top of the Heaven, journey out therefrom and stand upon the Roof thereof without, and, standing, are carried round by the circuit, and behold those things which are without the Heaven.”

These immortal souls reach the place which is above the Heaven, that is, the place above the canopy. Plato states that “no poet here hath ever praised, nor shall praise worthily, this locality. * * * The Substance which Verily Is, which hath no color and no shape, and hand cannot touch. * * * Round about this Substance, in this Place, dwelleth True Knowledge.” This fact is indeed true, when the canopy fell the true nature of the universe was revealed and the day of the gods passed forever away.

The Phædrus Myth next depicts the condition of the other classes of souls; those which could not reach this region above the canopy where all truth was revealed. “This is the

life of the Gods. Of the other Souls, whichsoever followeth God best, and is made most like unto Him, keepeth the head of her Charioteer lifted up into the Place without the firmament, and is carried round with the circuit thereof, being troubled by the Horses, and hardly beholding the Things Which Are; after her cometh the Soul, which for a space keepeth the head of her Charioteer lifted up, and then again sinketh down, and because of the violence of the Horses, seeth some of the Things Which Are, but some she seeth not.

“Beside these follow other Souls, which all do strive after that which is above, but are not able to reach unto it, and are carried round sunken beneath the face of the Heaven, trampling upon one another, running against one another, and pressing on for to outstrip one another, with mighty great sound of tumult and sweat of the race; and here, by reason of the unskilfulness of the Charioteers, many Souls are maimed, and many have their wings broken; and all, greatly travailling, depart uninitiated, not having seen That Which Is, and turn them to the food of Opinion.”

The two Symposium Myths next hold our attention, and we quote the following from the one told by Aristophanes. Describing a sky-born phenomenon, the record says: “Now, the genders were three, and of this sort, because the male gender was in the beginning sprung from the Sun, and the female gender from the Earth, and that which partook of both from the Moon—for the Moon partaketh of both Sun and Earth (the moon of mythology is the crescent canopy): so it came to pass that they themselves and their manner of progression were circular after the likeness of their parents: and they were terrible by reason of their strength and valor; and their hearts were proud, and they made assault upon the Gods, for that which Homer telleth concerning Ephialtes and Otus is told concerning them—that they essayed to go up into Heaven for to lay hands on the Gods.”

Attention is directed to the fact that Plato in the above

quotation distinctly compares this matter to a Homeric tale. In other words, it has come down to him from the distant past, and he only catches the jangling echo. "Wherefore Zeus and the other Gods took counsel what they should do (with these sky-forms), and were in doubt; for they were not minded to slay them, as they slew the giants, with thunderbolts."

Briefly, this myth depicts round people, children of round parents, who are very swift and strong, attacking Zeus and the other gods in their stronghold. Instead of destroying them as they did the giants, Zeus cuts them in two. Then follows philosophical deductions, etc. Plainly, the idea prevailed of old that the vapor heavens and the earth were one body, and that this body had life made up of other life. Human life was compared to the body-life of the universe, hence the analogy in the myth.

The other Symposium Myth, or the Discourse of Diatima, asks: "What, then, is Eros?—is he Mortal?" The answer is that he is a Dæmon, something betwixt God and Mortal. The ephemeral sky scenes were likened to the fitting conditions which surround a human soul. The Dæmons, Hesiod said, dwell in 'the parts about the Earth,' and more especially 'in the Air.' They were souls of disembodied spirits inhabiting the celestial vault. Some lived on earth in the Golden Age. Some died in the Silver Age. Others were Copper Men of the third age. While others, again, were the Heroes of the fourth age—those who had fought at Thebes and Troy. These last battles were primarily encounters between the sky-forces; afterwards they became associated and mixed in with actual history. The fifth age, or that of Iron, is the present.

CHAPTER XX

MYTHS OF THE AMERINDS

THE Indians of the Americas, like the peoples of the Old World, recognized the fact that in times long past something divided up the cycles of duration and separated the one from the other.¹ "Neither Jews nor Aztecs, nor indeed any American nation," says Britton, "appear to have supposed, with some of the old philosophers, that the present was an exact repetition of previous cycles, but rather that each was an improvement on the preceding, a step in endless progress. Nor did either connect these beliefs with astronomical reveries of a great year, defined by the return of the heavenly bodies to one relative position in the heavens. The latter seems characteristic of the realism of Europe, the former of the idealism of the Orient; both inconsistent with the meagre astronomy and more scanty metaphysics of the red race.

"The expectation of *the end of the world* is a natural complement to the belief in periodical destructions of our globe. As at certain times past the equipoise of nature was lost, and the elements breaking the chain of laws that bound them ran riot over the universe, involving all life in one

¹ As an instance of Old-World thought on these divisions, we would recall the fact mentioned in chapter xvi, that "Epictetus favors the opinion that at the solstices of the great year not only all human beings, but even the gods, are annihilated; and speculates whether at such times Jove feels lonely (Discourses, b. iii, ch. 13). Macrobius, so far from coinciding with him, explains the great antiquity of Egyptian civilization by the hypothesis that that country is so happily situated between the pole and equator, as to escape both the deluge and conflagration of the great cycle (Somnium Scipionis, lib. ii, cap. 10). "The Myths of the New World," 3d ed., p. 234. By way of comment, we might add that Macrobius has hit the nail on the head.

mad havoc and desolation, so in the future we have to expect that day of doom." ²

The Aztecs believed in four ages. Brinton thinks that "Doubtless the theory of the Ages of the world was long in vogue among the Aztecs before it received the definite form in which we now have it; and as this was acquired long after the calendar was fixed, it is every way probable that the latter was used as a guide to the former. Echevarria, a good authority on such matters, says the number of the Suns was agreed upon at a congress of astrologists, within the memory of tradition." ³

The Quichés also believed in four ages. The legend of these aborigines is to this effect: "By the will of the Heart of Heaven the waters were swollen and a great flood came upon the manikins of wood. For they did not think nor speak of the Creator who had created them, and who had caused their birth. They were drowned, and a thick resin fell from heaven.

"The bird Xecotecovach tore out their eyes; the bird Camulatz cut off their heads; the bird Cotzbalam devoured their flesh; the bird Tecumbalam broke their bones and sinews and ground them into powder." ⁴

These four birds, whose names have lost their signification, no doubt originally represented four different vapor-belts, or, as Brinton says, "the four rivers, which, as in so many legends, are the active agents in overwhelming the world in its great crises." Probably at a later date, when the canopy-belts were forgotten, these birds came to represent the four winds.

In the Iroquois narrative, their ancestor was kicked from the sky by her irate spouse. When she fell there was as yet no land to receive her, but suddenly it began to bubble up under her feet and waxed bigger and bigger. The Algonkin

² "The Myths of the New World," 3d ed., p. 253.

³ *Ibid.*, p. 252.

⁴ *Ibid.*, p. 242.

tribes had similar ideas, but their cosmology was of a reconstructive rather than a constructive nature. "A reconstruction supposes a previous existence. This they felt, and had something to say about an earth anterior to this of ours, but one without light or human inhabitants. A lake burst its bounds and submerged it wholly." ⁵

The thought of a dark world is one of the commonest to mythology. The Egyptians said: "The heaven rests upon the earth, like a goose brooding over her egg." ⁶ Naturally, among the less enlightened peoples the blackness under the shroud-like canopy must have been appalling. There was indeed something brooding over them. "Even the Bushmen of South Africa have the strange idea that the sun did not shine on their country in the beginning. Only after the children of the first Bushmen had been sent up to the top of the world and had launched the sun was light procured for this South African region. A similar myth was found among the Australian aborigines." ⁷

"In the cosmogony of the Hidery Indians, the creator of the world, Nekilstluss, in the shape of a raven, existed from all eternity. Before the world came into being, he brooded over the intense darkness that prevailed, until, after æons of ages, by the continual flapping of his wings he beat the darkness down to solid ground. For a long time the only light in the world was a dim, hazy one, given off by the earth. When the earth was in a condition to receive the stronger light from the sun, moon, and stars, he set out to get hold of them. They were in possession of a great chief, who had them in three separate boxes, kept them only for his own use, and refused to part with them. Nekilstluss, having obtained one of the boxes by a ruse, broke it open. It hap-

⁵ *Ibid.*, pp. 231, 232.

⁶ Tiele, "History of the Egyptian Religion," p. 67.

⁷ William F. Warren, "Paradise Found," p. 200. "Bushman Folklore," by W. H. J. Bleek. "Parliament Report," Cape Town and London, 1875: p. 9.

pened to be the sun that he had got, and this he took in his beak, and, flying up, placed it in the heavens, where it has been ever since. After this he obtained the two other boxes by another ruse, and, having broken them open, let out the moon and stars, which he placed in the heavens, where they have ever since continued to shine.”⁸

The Thlinkeets, an Alaskan tribe, say that Yehl is the maker of wood and of water; undoubtedly he was originally the canopy. The story tells us that “at that time the sun, moon, and stars were kept by a rich chief in separate boxes, which he allowed no one to touch. Yehl, by strategy, secured and opened these boxes, so that the moon and stars shone in the sky. When the sun-box was opened, the people, astonished at such an unwonted glare, ran off into the mountains.”⁹

Ignatius Donnelly is responsible for the following instances of a somewhat opposite nature, where the sun is caught in the canopy-net instead of being liberated. It will be seen they are of the same character as the boxing of Osiris in the coffin, and of Perseus and his mother in the chest. They illustrate the yearly phenomenon of the disappearance of the sun beneath the great black obscuring thing. The first tale says:

“There was once, according to the Ojibway legends, a boy; the sun burned and spoiled his bird-skin coat; and he swore that he would have vengeance. He persuaded his sister to make him a noose of her own hair. He fixed it just where the sun would strike the land as it rose above the earth’s disk; and, sure enough, he caught the sun, and held it fast, so that it did not rise.

“The animals who ruled the earth were immediately put into great commotion. They had no light. They called a council to debate upon the matter, and to appoint some one

⁸ *Scientific American Supplement*, No. 1032.

⁹ F. S. Dobbins, “Gods and Devils of Mankind,” p. 371.

to go up and cut the cord, for this was a very hazardous enterprise, as the rays of the sun would burn up whoever came so near. At last the dormouse undertook it, for at this time the dormouse was the largest animal in the world; when it stood up it looked like a mountain. (The dormouse undoubtedly was a vapor-form.) When it got to the place where the sun was snared, its back began to smoke and burn with the intensity of the heat, and the top of its carcass was reduced to enormous heaps of ashes. It succeeded, however, in cutting the cord with its teeth and freeing the sun, but it was reduced to a very small size, and has remained so ever since. * * *

“Among the Wyandots a story was told, in the seventeenth century, of a boy whose father was killed and eaten by a bear, and his mother by the Great Hare. He was small, but of prodigious strength. He climbed a tree, like Jack of the Bean-Stalk, until he reached heaven.

“He set his snares for game, but when he got up at night to look at them he found everything on fire. His sister told him he had caught the sun unawares, and when the boy, Chakabech, went to see, so it was. But he dared not go near enough to let him out. But by chance he found a little mouse, and blew upon her until she grew so big she could set the sun free, and he went on his way. But while he was held in the snare, day failed down here on earth. (It was the age of darkness, under the canopy.) * * *

“The Dog-Rib Indians, far in the northwest of America, near the Esquimaux, have a similar story. Chakabech becomes Chapewee. He too climbs a tree, but it is in pursuit of a squirrel, until he reaches heaven. He set a snare made of his sister's hair and caught the sun. ‘The sky was instantly darkened.’ Chapewee's family said to him, ‘You must have done something wrong when you were aloft, for we no longer enjoy the light of day.’ ‘I have,’ replied he, ‘but it was unintentionally.’ Chapewee sent a number of

animals to cut the snare, but the intense heat reduced them all to ashes. At last the ground-mole, working in the earth, cut the snare, but lost its sight, and its nose and teeth have ever since been brown as if burnt." The same myth is current in other lands. Thus:

"Maui is the Polynesian god of the ancient days. He concluded, as did Ta-wats,¹⁰ that the days were too short. He wanted the sun to slow up, but it would not. So he proceeded to catch it in a noose, like the Ojibway boy and the Wyandot youth. The manufacture of the noose, we are told, led to the discovery of the art of rope-making. He took his brothers with him; he armed himself, like Samson, with a jaw-bone, but instead of the jaw-bone of an ass, he, with much better taste, selected the jaw-bone of his mistress. She may have been a lady of fine conversational powers (the canopy it will be remembered was the source of many terms and root words and also the cause of the confusion of tongues). They traveled far, like Ta-wats, even to the very edge of the place where the sun rises. There he set his noose. The sun came and put his head and fore-paws into it; then the brothers pulled the ropes tight, and Maui gave him a great whipping with the jaw-bone; he screamed and roared; they held him there for a long time (the Age of Darkness), and at last they let him go; and, weak from his wounds (obscured by the canopy), he crawls slowly along his path. Here the jaw of the wolf Fenris, which reached from earth to heaven, in the Scandinavian legends, becomes a veritable jaw-bone which beats and ruins the sun."¹¹ * * *

"It is a curious fact that the sun in this Polynesian legend is Ra, precisely the same as the name of the god of the sun in Egypt, while in Hindustan the sun-god is Ra-ma.

¹⁰ See chapter xvi.

¹¹ This pendent jaw-sky-bone is similar to the gigantic clam-shell which Pythias declared could have swallowed up his ship. See chapter xvii.

“In another Polynesian legend we read of a character who was satisfied with nothing—‘even pudding would not content him’—and this unconscionable fellow worried his family out of all heart with his new ways and ideas. He represents a progressive, inventive race. He was building a great house, but the days were too short; so, like Maui, he determined to catch the sun in nets and ropes; but the sun went on. At last he succeeded; he caught him. The good man then had time to finish his house, but the sun cried and cried ‘until the island of Savai was nearly drowned.’ * * *

“And these myths of the sun being tied by a cord are, strange to say, found even in Europe. The legends tell us:

“In North Germany the townsmen of Bösüm sit up in their church-tower and hold the sun by a cable all day long; taking care of it at night, and letting it up again in the morning. In ‘Reynard the Fox,’ the day is bound with a rope, and its bonds only allow it to come slowly on. The Peruvian Inca said the sun is like a tied beast, who goes ever round, in the same track.” In the days when the ephemeral vapor-forms were ever changing their courses the fact that the sun, seen in his halo-boat, seemed to journey in a fixed or tied-up path must have been especially noticeable.

“Let us change the scene again to the neighborhood of the Aztecs. We are told of two youths, the ancestors of the Miztec chiefs, who separated, each going his own way to conquer lands for himself.

“The braver of the two, coming to the vicinity of Tilantongo, armed with buckler and bow, was much vexed and oppressed by the ardent rays of the sun, which he took to be the lord of that district, striving to prevent his entrance therein. Then the young man strung his bow, and advanced his buckler before him, and drew shafts from his quiver. He shot these against the great light even till the going down of the same; then he took possession of all that land, seeing that he had grievously wounded the sun and forced him to hide

behind the mountains (canopy and vapor-belts). Upon this story is founded the lordship of all the caciques of Mizteca, and upon their descent from this mighty archer, their ancestor. Even to this day, the chiefs of the Miztecs blazon as their arms a plumed chief with bow and arrows and shield, and the sun in front of him setting behind gray clouds."¹²

Another class of these uncanny, cold-blooded reminiscences actually portrays primeval man living in a cave under a world-roof; the darkness of the cave is depicted, and the cave is said to be so big that all the animals of the world live in it with man. Bancroft says:

"The Navajos, living north of the Pueblos, say that at one time all the nations, Navajos, Pueblos, Coyoter^{os}, and white people, lived together underground, in the heart of a mountain, near the river San Juan. Their food was meat, which they had in abundance, for all kinds of game were closed up with them in their cave; but their light was dim, and only endured for a few hours each day." The Indians were aware that this grotto covering was water (vapor). Bancroft goes on to tell how the Moth-worm (the totemic emblem of a family) "mounted into the breach, and bored and bored till he found himself suddenly on the outside of the mountain, and surrounded by water." The story goes on to relate that "when these nations lived underground they all spake one tongue; but, with the light of day and the level of earth, came many languages. The earth was at this time very small, and the light was quite as scanty as it had been down below, for there was as yet no heaven, no sun, nor moon, nor stars. So another council of the ancients was held, and a committee of their number appointed to manufacture these luminaries." The "dum fluter" is said to

¹² "Ragnarok," pp. 181-185. Brinton, "Myths of the New World," pp. 165, 217. Tylor's "Early History of Mankind," pp. 348, 347, 352. Richardson's "Narrative of Franklin's Second Expedition," p. 291. Bancroft, "Native Races," vol. iii, p. 73.

have been given the final charge of making these orbs. Then we are told that the increasing size of the earth necessitated the putting back of the sun from the earth, by which we understand that the old shiner gave place to the true sun as the atmosphere cleared, thus the source of light appeared to be moved farther away." ¹³

As the canopy approached its last stage its increased size was apparent to all, the world-mountain seemed to be about to swallow everything in its fearful maw. "The Karens say that Twa Wya, going to the Sun (shiner) that he might make him grow, was so increased by the Sun (shiner) that his head touched the sky (he was the true sun). He went forth on various adventures over the earth, and was after a time swallowed by a snake. The reptile being cut open, Twa Wya came back to life (like 'Osiris Found'). The Basutos tell that Litaolane, their hero, was swallowed by a monster, but that he cut his way out, and set free all the inhabitants of the world. The Zulus say the maw of the monster that devoured the Princess, and men, dogs, etc., has forests, rivers, hills, cattle, and people living there, and when at length he is cut open, out come they all; the cock appears first, and he cries out in his rapture of joy, 'Kukuluku,—I see the world.' In the Algonquin, Manabozho, angling for the King of Fishes, was swallowed up, canoe and all; he belabored the monster with his war-club until he would fain have cast him out again, but Manabozho set his canoe across the fish's throat inside and despatched him; the fish drifted ashore and the gulls pecked a place by which the hero could come out." ¹⁴

It should be remembered that there were at least two caves in the heavens (cavernous-like places): Calypso's cavern and the equatorial slit. The Peruvians have a legend

¹³ "Native Races," vol. iii, p. 81.

¹⁴ Charles De B. Mills, "The Tree of Mythology," pp. 96-97.

of their god Ataguja sending to the earth the first of mortals, who there seduced the sister of a certain Guachemines, or rayless one, a darkling. The sister proved pregnant, and died in her labor, giving birth to two eggs, the sun and moon. From these emerged the two brothers, Apocatequil and Piguerao.¹⁵ It is significant that this Ataguja came from the east and disappeared in the Western Ocean, four civilizers following him, who emerged from the cave of the House of Birth.

"All the tribes on the Northwest Coast," says Brinton, "attribute the creative act to the original Raven (canopy), who lived before the sun was formed. He found it by one or another accident, and, picking it up, 'placed it in the heavens, where it has been ever since.' With the Kootenays it is either the coyote or the chicken hawk who manufactures the sun out of a ball of grease and sets it in the sky to pursue its course—rude fancies, but serving as well as any to show that these tribes did not regard the sun as the visible creator or the highest divinity."¹⁶

Donnelly very truly remarks: "A great solar-myth underlies all the ancient mythologies. It commemorates the death and resurrection of the sun. It signifies the destruction of the light by the clouds, the darkness, and the eventual return of the great luminary of the world.

"The Syrian Adonis, the sun-god, the Hebrew Tamheur, and the Assyrian Du-Zu, all suffered a sudden and violent death, disappeared for a time from the sight of men, and were at last raised from the dead."¹⁷ But we would add that these disappearances were due to the zonal vapor-belts in the higher atmosphere and to the canopy that soared above all.

Among the Mexicans is the following legend of the returning of the sun: "Now, there had been no sun in existence for many years; so the gods, being assembled in a place called

¹⁵ Brinton, "Myths of the New World," 3d ed., p. 184.

¹⁶ *Ibid.*, p. 166.

¹⁷ "Ragnarok," p. 233.

Teotihuacan, six leagues from Mexico, and gathered at the same time around a great fire, told their devotees that he of them who should first cast himself into that fire should have the honor of being transformed into a sun. So one of them, called Nanahuatzin, * * * flung himself into the fire. Then the gods began to peer through the gloom in all directions for the expected light, and to make bets as to what part of heaven he should first appear in. Some said 'Here,' and some said 'There'; but when the sun rose they were all proved wrong, for not one of them had fixed upon the east." ¹⁸

Donnelly, commenting on the myth, says: "In the long-continued darkness they had lost all knowledge of the cardinal points." ¹⁹

The arrival of the bright one, like the advent of Osiris, was no doubt heralded with great joy. Mills says:

"Among the American Indians the term Michabo, literally 'the Great White One,' means also in some connections the Great Hare, and so manifold tales have sprung up in the attempt to explain why this appellation should have been used for the supreme. So a like illusion in Greece was due to the impression that Zeus Lykaïos, literally the 'Light One,' was Zeus Lupine, from the resemblance of *Lukaïos* to *Lukos*; as Phoibos Lykegenes, literally 'offspring of light,' was supposed wolf-born." ²⁰

"Now, it appears," remarks Brinton, "on attentively examining the Algonkin root *wab*, that it gives rise to words of very diverse meaning, that like many others in all languages, while presenting but one form, it represents ideas of wholly unlike origin and application; that in fact there are two distinct roots having this sound. One is the initial syllable of the word translated hare or rabbit, but the other

¹⁸ Bancroft, "Native Races," vol. iii, p. 46.

¹⁹ "Ragnarok," p. 216.

²⁰ "The Tree of Mythology," pp. 38-39.

means white.”²¹ From the light shed by the present hypothesis it is clear that these two roots are from one common source. ‘The White One,’ or the sun, was also ‘The Swift One,’ the hare. The dialect forms, according to Brinton in Algonkin, for white are: wabi, wape, wompi, waubish, oppai; for light: oppung; for hare: wab, etc., etc.

When the old sky passed away, words lost their meaning, and the echo that has come down to us is robbed of much of its poetry. “The California tribes spoke of their chief deity as ‘the Old Man above.’ * * * In the legends of the Aztecs and Quiches such phrases as ‘Heart of the Sky,’ ‘Lord of the Sky,’ ‘Prince of the Azure Planisphere.’ ‘He above all,’ are of frequent occurrence; and by a still bolder metaphor, the Araucanians, according to Molina, entitled their greatest god ‘the Soul of the Sky.’”²²

Let us endeavor to catch the fleeting breath of at least one of these myths before the ‘Soul of the Sky’ perishes forever. The one selected is that of the legend of Olelbi.

’T was a light that gleamed on the hilltops,
 ’T was a light that gleamed afar,
 Away in the distant purple west
 Where the Wintu people are.

Such light belongs to the cloud-lands,
 To the regions high above
 Where heaven’s ocean reels around
 And floats forth as a dove.

Like a beacon it seemed to flutter,
 Like a beacon it seemed to wave,
 And ever anon it caught new life
 And flickered forth from the grave,

Calling me, in the spirit, with the
 Hurried sigh of death,—
 “The Wintu people perish, come
 Catch their parting breath.”

²¹ “The Myths of the New World,” 3d ed., p. 198.

²² *Ibid.*, p. 65.

And I found upon the hilltops
In the spirit that breathes the air
A freedom from the earth-chains,
A freedom everywhere.

And the winds sighed back in sorrow,
And the winds sighed back again,
Telling in accents softly of
The truths that still remain.

These whispered of the wondrous past
Before the Wintus were—
When the first people walked the earth;
Heaven's amphitheatre.

Then like on Mount Olympus,
I saw a palace fair
O'erhanging and o'ershadowing
The world beneath, four-square.²³

To this my soul by Siriwit was
Lifted up on high.
And the beauty of that marvelous hut
Entranced my eager eye.

Siriwit the whirlwind whistled
And whisked away in a race
While I in leisure viewed the scene
And entered the holy place.

Perfumed were all the breezes
Which came from the "Central Blue,"
From the mansion of Ollebis,
Laden with the flower-dew.

Olelpanti Hlut was covered all
Over within and without
With flowers whose roots immortal
Bloomed from every sprout;

²³ "In the Ollebis song," says Jeremiah Curtin, "the great one above is the cloud-compeller, as in classic mythology." The song of this spirit is, "I am great above. I tan the black cloud (there)." In those days there were Kahsuku, cloud dogs, cloud people. "Creation Myths of Primitive America," pp. 36, 516.

Bloomed, and blazed in glory on
The living oak-tree frame,
As the world-ash of Scandinavia
Whose flowers existed in flame,

And above and all around it
The acorns ripened and fell.
Panti Hult with these was covered
As all the heroes tell.²⁴

Breathing this air ethereal
I looked from the "Central Blue"
From the mansion of Ollebis
And from there I saw anew:

Down on the earth the battle with
The water element,
And the first people looking up
At the troubled firmament.

Peace had reigned for ages, but
Behold now the end had come,
And with terror they beheld the "Swift"
The sky become quarrelsome.

Katkatchila, the racing hunter,
Who upheld the ring-world cloud,
Who ran in his brodered garment,
Who always beat the crowd.

Katkatchila now was angry for
Red-fox had taken his flint,²⁵
He had shot at a deer with Dokos
And Hau beat him out in the sprint.

Hau stuck the stone in his left ear
To hide it away from "Swift's" sight,
But the latter rose in his anger
And travelled away in the night.

²⁴ "That house stood in the morning dawn," says Curtin, "a mountain of beautiful flowers and oak tree branches; all the colors of the world were on it outside and inside. The tree in the middle was far above the top of the house, and filled with acorns; a few of them had fallen on every side." *Ibid.*, p. 19.

²⁵ Flint in Indian Mythology represents fire. In this action we have sun-fire breaking through the sky-roof, which ends the Golden Age.

Hau took the stolen flint-stone
To the sweat-house and showed it there,
But all of the first people
Began to see the snare.

Titchelis, the little ground squirrel,
Attempted to take it home,
But meanwhile Katkatchila had
Raised the sea in a foam.

It tossed around in anger.
Poháramas, shooting star,
And Yonot, his Buckeye sister,
Unloosed a sky-prop spar.

Then he took Pohila (fire-child)
And with pine that was full of pitch
He started a flame in the clean swept place²⁶
Which leapt o'er the hill and ditch.

Southeast Poháramas went
And Tilikus to the southwest rushed
Each with a brand of the burning pine,
Each by the crimson flushed.

And these set fire to the firmament as
Phæton did in Greece—
The Golden Age was ended
And war had succeeded peace.²⁷

As I watched from Olelphanti
I saw all these things below—
Olelbis looked down on the burning world,
On the scene of fire and woe:

²⁶ The "egg-hole" of classic mythology, "the empty place," "Tam-muz bleeding," etc. The ruddy glow diffused over this place gave rise to the belief that the canopy was burning. The Scandinavians saw it and knew that Ragnarok, "the twilight of the gods," was at hand.

²⁷ "Soon all saw that the fire was coming toward them from the east and the west, like waves of high water, and the line of it was going northward quickly. The fire made a terrible roar as it burned; soon everything was seething." "Creation Myths of Primitive America," p. 13.

Nothing but waves of flame we saw,
And the sparks mounting up to the skies,
Which there became kolchituh,
The shining stars (sky-eyes).²⁸

We watched this fire together with
The old women who made his bread:
Pákchuso and Pokaila,
As one, advised and said:

"Grandson," said the old women,
"If you want this wakpohas put out,
There's a very old man, Kahit Kiemila,
Who lives in the north, thereabout.

"He lives outside of the first sky.
He stays there in one little place.
Ask him to send us Mem Loimis,
For water must red-fire chase."

Olelbis called Lutchi and Sutunut.

"Go, Lutchi, pry up the sky.

"Go, Sutunut, carry these feathers
To Kahit to signify

"That I wish him to send Mem Loimis through
The hole which Lutchi pries up.
I have given a sky prop to help him.
Now, hurry, the world dries up!"

Lutchi took the sky-pole
And placed the prop underneath,
Mem Loimis rushed through the open place²⁹
And quenched the fire beneath.

²⁸ "Great rolls, and piles of smoke were rising; fire flew up toward the sky in flames, in great sparks and brands. Those sparks became kolchituh (sky-eyes), and all the stars that we see now in the sky came from that time when the first world was burned. The sparks stuck fast in the sky, and have remained there ever since the time of the wakpohas (world fire)." *Ibid.*, p. 15.

²⁹ Of this open place Curtin says: "There was so much water outside that could not come through that it rose to the top of the sky and rushed on toward Olelpanti." *Ibid.*, p. 22.

She rushed like a crowd of rivers, and
 Covered all the earth,
 And naught was left but a wilderness—
 There was nothing left of worth.

Then Kahit, the force centrifugal,
 Quickened the speed of the ring,
 And she fell backward coming,
 Which stopped the great sky-spring.

So Kahit drove her backward to
 The cloud-bag from whence she came.
 (A bag that could carry everything—
 The earth itself, some claim).³⁰

Thus she retreated backward
 Into the very north,
 Where she sought again the region
 From which she had sallied forth;

But when she reached the sun-fish,
 She divided, east and west,
 And came to the hut of Olelbis
 And became his wife which was best.³¹

There from their home of flowers, they
 Looked down on the fleshless earth—
 Down, down on the dreadful barren dust
 On the scene of fire and dearth.

³⁰ The cloud-bag is borrowed from the myth of Norwanchakus and Keriha. In this myth the existence of Puriwa, darkness, and Sanihas, daylight, before the sun was in the world, is very instructive, and the fact that the Polar-star, Waida Werris, was seen in the sky-hole in the north is remarkable. Light and darkness existed outside of the sky, and were stolen from that place. Under the cloud-bag it was very dark. Keriha went beyond the sky on the southeast.

³¹ In the myth of Olelbis and Mem Loimis, the sons of these mighty parents pass beyond the third horizon in search of their mother (water), who had been stolen away. Wokwuk, their companion, had tied the hair on the top of his head with a young grapevine; he had a bone stuck through it, and with this bone he raised the sky. "When they had passed the third sky, they could see far east. Everything was nice there and looked clear, just as it does here at daylight, when all is bright and beautiful." *Ibid.*, p. 60.

"O!" cried out Olelbis, "we
Must start all things afresh."
So he made the sky into a sieve,
A net of the finest mesh.

Through this he sifted the sunshine,
And then again the rain—
Throwing down all of his flowers, and
The seed of the corn and grain.

Transforming all the first people,
He made them over anew,
And 't was thus the earth was peopled,
Wokwuk to the forest flew.

Jeremiah Curtin says: "Olelbis took a great sky net (kolchi koro), and it spread out; it reached to the ends of the sky in every direction; it was full of small, fine holes, like a sieve."³² Beneath this canopy the earth was bare. "There is nothing on it. What can we do for it?" cried Olelbis. Clover, beautiful grasses, and plants of all kinds were growing around his own sweat-house, so at his grandmother's suggestion he transferred them to earth.³³

"Next morning Olelbis said: 'Now, my grandmother, what do you think best? What are we to do with the people here? Is it best for them to stay in Olelpanti?'

"Our grandson,' answered the old women, 'send all that are not needed here to the lower world; turn them into something good for the people who are to come soon—those fit for the place up here. The great people, the best ones, you will keep in Olelpanti, and send down only a little part of each of them to turn into something in the world below and be of use to people there.'"³⁴

It is also recorded in the myth that "different bits of Wokwuk came down to the earth and were turned into elk and various valuable creatures."³⁵ The Indians believe

³² *Ibid.*, p. 27.

³³ *Ibid.*, pp. 33-34.

³⁴ *Ibid.*, pp. 43-44.

³⁵ *Ibid.*, p. 495.

Wokwuk to be a large bird. But we can see in the legend the great wings of the upper canopy. Bits of this Wokwuk came to the earth. The reclothing and repopulating of the devastated area with new species shows that even the Amerinds have retained some knowledge of the great underlying principle which is to evolution as the governor is to the steam-engine.

The only living being who escaped the destruction was Sedit, the coyote, and he did so by going south. This is in harmony with all that we have said about the distribution of animals. The danger of the conflagration was of course first seen in the pillars of the canopy to the east and to the west. We read in the legend that Olelbis sent his uncle up on the west side of his sweat-house to look, saying, "We are going to have trouble." He also sent his brother up on the east side for the same purpose. Lutchi, however, was watching the north, and it was from this quarter the world-storm finally came.³⁶

The Yanas, who were especially fond of astronomical myths, have left us a somewhat similar legend to that of Olelbis. It is called "The First Battle in the World." In this myth, the Master of Flint, Kaltsauna, afterwards transformed into a lizard or kind of Midgard serpent, prized his weapon so highly that when it was stolen he did not hesitate to set the whole world on fire.³⁷

Another beautiful myth of the Yanas sets forth a deadly feud between the flint-people, that is, fire, and the grizzlies,

³⁶ *Ibid.*, p. 20.

³⁷ From all parts of the world we have like tales. Hesiod says: "Prometheus stole the far-seen ray of unwearied fire in a hollow stalk of fennel" (*Theogony* 566). Some say he stole it from the altar of Zeus, others that he lit his rod at the sun, *i.e.*, the "canopy shiner." The Australians have a similar fable: a black fellow climbed by a rope to the "shiner." Birds and animals play the leading *rôles* everywhere. A bird brings fire in the Andaman Isles, and among the Ahts it is said that a fish, which would remind one of Ea, owned fire; other beasts, or canopy-forms, stole it.

that is, the cloud-people, denizens of the canopy. In this myth the sunlight has a series of adventures which resemble the labors of Hercules. Baby Tsawadi Kamshupa, 'young red flint clover fire,' like the infant Hercules, grew very fast. His labors were: First, he broke a great bow, that is, a vapor arch. Second, he broke a great many bows. In fact, he seems to have had quite a fancy for this amusement, as he broke all that there were but one. Third, he wrapped himself in a deerskin, as Hercules did in the skin of the Nemean lion. This third labor also mentions his arrows, the sun-shafts. Fourth, he killed one Tenna woman, that is, a grizzly, a cloud. Fifth, he killed fifty. Sixth, he killed fifty more. Seventh, he disposed of fifty more, and finally we find that in his next labor, the eighth, he killed all that were left outside of the sweat-house. Ninth, he entered the sweat-house and did his killing inside. Only four Tennas remained alive. Tenth, he showed these how he could jump. Eleventh, he shot three of these creatures with arrows. The fourth Tenna, however, escaped, and from that cloud come all the storms that are in the world in our time. Twelfth, Ilhataina, the thunder, was born. "Ilhataina began to talk," says Curtin, "and the sweat-house trembled. He shouted; the whole earth shook. He was thundering."³⁸

Another beautiful allegorical picture represents this boy as trying to break a very ugly old bow whose owner had been killed by Gowila, the terrible and strong lizard. To break this bow Ilhataina took a stone, intending to crush it. The bow flew out of his hand, and the stone fell. One may almost imagine that they hear the sound of the thunder-clap. In the Wintu myths, Walskit, lightning, is the child of Wima Loimis, grizzly-bear, the cloud-maiden and the sun.

The Algonquin hero Michabo is also somewhat of a noisy fellow. He slew the shining prince of serpents with a sun-

³⁸ *Ibid.*, p. 310.

dart, and, further, the conqueror then clothed himself with the skin of his foe and drove the rest of the serpents to the south to the land of the lightnings. A like hero-god of the Iroquois destroyed with a thunderbolt the great horned serpent. The God of Waters was the Thunder Bird.³⁹

Innumerable myths are connected with the thought of the waters and a flood. "The two gods of the universe," said O-dig-i-ni-ni'-a, the relater of the mythic lore of the Havasupais (Amerinds of the Southwest), "are Tochopa and Hokomata. Tochopa he heap good. Hokomata heap han-a-to-op'-o-gi—heap bad—all same white man's devil. Him Hokomata make big row with Tochopa, and he say he drown the world.

"Tochopa was full of sadness at the news. He had one daughter whom he devotedly loved, and from her he had hoped would descend the whole human race for whom the world had been made. If Hokomata persisted in his wicked determination, she must be saved at all hazard. So, working day and night, he speedily prepared the trunk of a pinion tree by hollowing it out from one end. In this hollow tree he placed food and other necessities, and also made a lookout window. Then he brought his daughter, and, telling her she must go into this tree and there be sealed up, he took a sad farewell of her, closed up the end of the tree, and then sat down to await the destruction of the world. It was not long before the floods began to descend. Not rain, but cata-racts, rivers, deluges, came, making more noise than a thousand Hack-a-tai-as (Colorado River) and covering all the earth with water. The pinion log floated, and in safety lay Pu-keh-eh, while the waters surged higher and higher and covered the top of Hue-han-a-patch-a (the San Franciscos),

³⁹ "These are the same old-world stories elaborated in the struggles of Ormuzd and Ahriman, of Thor and Midgard, of St. George and the Dragon, and a thousand others." Brinton, "The Myths of the New World," 3d ed., pp. 139, 140.

Hue-ga-wōōl-a (Williams Mountain), and all the other mountains of the world.

"But the waters of heaven could not always be pouring down, and soon after they ceased the flood upon the earth found a way to rush into the sea. And as it dashed down it cut through the rocks of the plateaus and made the deep Chic-a-mi-mi (canyon) of the Colorado River (Hack-a-tai-a). Soon all the water was gone.

"Then Pu-keh-eh found her log no longer floating, and she peeped out of the window Tochopa had placed in her boat, and though it was misty and almost dark, she could see in the dim distance the great mountains of the San Francisco range. And near by the canyon of the Little Colorado, and to the north was the Hack-a-tai-a, and to the west was the canyon of the Havasu.

"The flood had lasted so long that she had grown to be a woman, and, seeing the water gone, she came out and began to make pottery and baskets, as her father long ago had taught her. But she was a woman. And what is a woman without a child in her arms or nursing at her breasts? How she longed to be a mother! But where was a father for her child? Alas! there was no man in the whole universe!

"Day after day longings for maternity filled her heart, until one morning—glorious happy morning for Pu-keh-eh and the Havasu race—the darkness began to disappear, and in the far-away east a soft and new brightness appeared. It was the triumphant Sun coming to conquer the long night and bring light into the world. Nearer and nearer he came, and at last, as he peeped over the far-away mesa summits, Pu-keh-eh arose and thanked Tochopa, for here, at last, was a father for her child. She conceived, and in the fulness of time bore a son, whom she delighted in and called In-ya'-a—the son of the Sun."⁴⁰

⁴⁰ George Wharton James, "The Indians of the Painted Desert Region," pp. 209-211.

Here is another story, told by Shaman of the Havasupais. Note the points of similarity and also the differences.

"In the days of long ago a man and a woman (Hokomata and Pukeheh Panowa) lived here on the earth. By and by a son was born to them, whom they named Tochopa. As he grew up to manhood Pukeheh Panowa fell in love with him and wished to marry him, but he instinctively shrank from such incestuous intercourse. The woman grew angry as he repelled her, and she made a number of frogs, which brought large volumes of water. Soon all the country began to be flooded with water, and Hokomata found out what was the matter. He took Tochopa and a girl and placed them in the trunk of a pinion tree, sealed it up, and set them afloat on the waters. He stored the tree with corn, peaches, pumpkins, and other food, so they would not be hungry, and for many long days the tree floated hither and thither on the face of the waters. Soon the waters began to subside, and the tree grounded near to where the Little Colorado now is. When Tochopa found the tree was no longer floating he knocked on the side, and Hokomata heard him and came and let him out. As he stepped on the ground he saw Huehanapatcha (the San Francisco Mountains), Huegadawiza (Red Butte), Huegawōōla (Williams Mountains), and he said: "I know these mountains. This is not far from my country." And the water ran down the Hack-a-tha-eh-la ('the salty stream,' or the Little Colorado) and made Hack-a-tai-a (the Grand Canyon of the Colorado)." ⁴¹

The Wallapais (Haulapais) of Arizona have the following Origin Legend:

"In the days of the long ago, when the world was young, there emerged from Shi-pá-pu two gods, named To-cho-pa and Ho-ko-ma-ta. When these brothers first stood upon the surface of the earth, they found it impossible to move around,

⁴¹ *Ibid.*, pp. 213-214.

as the sky was pressed down close to the ground. They decided that, as they wished to remain upon the earth, they must push the sky up into place. Accordingly, they pushed it up as high as they could with their hands, and then got long sticks and raised it still higher, after which they cut down trees and pushed it up higher still, and then, climbing the mountains, they forced it up to its present position, where it is out of reach of all human kind, and incapable of doing them any injury.”⁴²

⁴² *Ibid.*, p. 188.

CHAPTER XXI

RUSSIAN MYTHS

IN most of these Russian stories the original idea has been greatly obscured by the process of repetition and the course of travel from one region to another. Yet notwithstanding this smoothing off of the rough edges, the nature myths of this people, and especially their folk-tales, are rich in reminiscences of the forgotten lore of the heavens. Take the legend of "Yelena the Wise" as a sample.

A hero by the name of Ivan was wrecked on an island, which in the long forgotten past was probably located in the canopy-sea. Here he wandered, whether it was long or short, till he found a passage to the underground kingdom, which also in the long forgotten past was probably located in the canopy. In this kingdom the six-headed serpent lived and reigned in a white walled castle. Ivan represented himself to this being as his son, and was accepted as such.

"Some time passed, and the six-headed serpent said: 'My dear son, here are the keys of all the chambers; go wherever thy desire may lead thee, but do not dare to look into that chamber which is fastened with two locks, one of gold, the other of silver. I will fly around the world, will look at people, and amuse myself.'

"He gave the keys, and flew away out of the underground kingdom to wander through the white world. Ivan Tsarevich remained all alone. He lived a month, a second and a third month, and the year was coming to an end, when it became dreary for him, and he thought to examine the chambers; he walked and walked till he came straight in front of the forbidden chamber. The good youth could not restrain

himself; he took out the keys, opened both locks, the gold and the silver, opened the oaken door.

"In that chamber were sitting two maidens riveted in chains: one was Tsarevna Yelena the Wise, and the other her maid. The Tsarevna had golden wings, and her maid silver wings. Said Yelena the Wise: 'Hail, good hero! Do us a service not great: give us each a glass of spring water to drink.'

"Ivan, looking at her unspeakable beauty, forgot all about the serpent, pitied the poor prisoners, poured out two glasses of spring water, and gave them to the beautiful women. They drank, shook themselves; the iron rings were broken, and the heavy chains fell. The beautiful women clapped their wings and flew through the open window; then only did Ivan come to his mind. He shut the empty chamber, came out on the porch, sat on the step, hung his stormy head below his mighty shoulders, and grew powerfully, powerfully sad. How was he to give answer? Suddenly the wind began to whistle, a mighty storm rose up, the six-headed serpent flew home.

" 'Hail, my dear son!'

"Ivan answered not a word.

" 'Why art thou silent; or has something happened?'

" 'Evil, father,—I did not obey thy command. I looked into that chamber where two maidens were sitting riveted in chains; I gave them spring water to drink, they drank, shook themselves, clapped their wings, and flew out through the open window.'

"The serpent was terribly enraged; he began to abuse and curse in every fashion. Then he took an iron rod, heated it red hot, and gave Ivan three blows on the back. 'It is thy luck,' said he, 'that thou art my son; if thou wert not, I should eat thee alive.'"¹

¹ Jeremiah Curtin, "Myths and Folk Tales of the Russians, etc.," pp. 220-221.

Ivan then asked the serpent's permission to go in search of Yelena the Wise, whom he wished to marry. He was allowed to go, but learned that whoever would marry her must hide three times, and if found each time, he would then have his stormy head cut off. He accepted the conditions, and the first time he mounted on a blue-winged eagle's back above the third range of clouds—which language is very suggestive of the canopy—but by the aid of her looking-glass Yelena discovered him. "Ivan came to the earth, slipped off the eagle, went to the seashore, struck fire, and put it to the blue sea. Suddenly, from wherever he came, a giant pike swam to shore. 'Well, good youth, creep into my mouth; I'll hide thee in the bottom of the sea.' He opened his jaws, took in the young man, sank with him in the abyss of the sea, and covered him with sand.

"'Now,' thought Ivan, 'perhaps it will be all right.' But the point was not there.

"Yelena the Wise barely looked in the mirror, and saw everything at once. 'Stop, cunning fellow! I see thou hast gone into the giant pike, and thou art sitting now in the abyss of the sea, beneath rolling sands; it is time to come to shore.' The pike swam to shore, threw out the good youth, and vanished in the sea."²

Ivan now placed himself behind the mirror, which was nothing else than the shining canopy itself. "A little later Yelena the Wise ran to the chamber, looked and looked in the mirror. She could not see her bridegroom; the appointed time had passed. She grew angry, and with vexation struck the glass; it fell into fragments, and before her stood Ivan, the brave youth.

"There was no help for it,—she had to yield this time. At the house of Yelena the Wise there was no need of waiting to make mead or wine; that day they had a noble feast

² *Ibid.*, p. 226.

and a wedding. They were crowned, and began to live—to live on and win wealth.”³

There are a great many myths of this character, and closer acquaintance shows that in their primitive form they simply portray Ivan, the sun, conquering the snake, or canopy. Here is another illustrating this point:

“Once there was an old couple who had three sons. Two of them had their wits about them, but the third, Ivan, was a simpleton. Now, in the land in which Ivan lived there was never any day, but always night. This was a snake’s doing. Well, Ivan undertook to kill that snake. Then came a third snake with twelve heads. Ivan killed it, and destroyed the heads; and immediately there was bright light throughout the whole land. The myth is pushed on, and there is also the monster who devours maidens, called a ‘Norka’; and Perun takes the work of Indra and Saint George, enters the castle (dark clouds), and rescues her. But the dark power takes a distinctive Russian appearance in the awful figure of Koshchêi, the deathless.”⁴

The Russian skazkas describe Perun, the god of light, as sometimes lying for a while veiled in a shroud—the fog—or floating over dark water in a coffin—the cloud. He is the thunder-god, the Thor of the Slavonian tradition. The snake-canopy dies when the sun and moon finally establish themselves.

In the tale of “Kiss Miklos and the Green Daughter of the Green King,” a certain kingdom was in unbroken darkness, without sun and without moon, by which we know that it was located under the canopy. Three brothers went out to find the missing luminaries. The youngest was Kiss

³ *Ibid.*, p. 227. The Russian title of Afanasyeff’s work, from which the above myth and most of those which follow are culled, is “*Narodnaya Russkiya Skazki*.” “Yelena the Wise” is found in part vii, p. 304.

⁴ L. E. Poor, “Sanskrit and its Kindred Literatures,” p. 390.

Miklos, or, as we would say in English, Nicholas Little. This young one was probably one of the least of the new-born little scenes in the vapor-sky. He travelled on a magic six-legged steed which was unquestionably a sun-dog, or halo, for it was said of him that he ate live coals. Nicholas Little carried a sun-sword which when he said to it, "Cut, my dear sword," forthwith cut down whatever he wished.

Now, the three brothers moved on their way, beyond the glass mountains, and beyond that, to where were the little short-tailed pig roots (vapor cloud), and farther than that, and still farther, till they came to the silver bridge (upper bright belt). Here Nicholas Little encountered the twelve-headed dragon, conquered him, and gave the liberated moon to one of his brothers to carry. Then they went on to the golden bridge, which was still higher. Here Nicholas Little killed the twenty-four-headed dragon and liberated the sun, which he gave to his other brother to carry.

On the way home the two wives of the serpents, and the old woman, their mother, conspired to kill the heroes. The old woman was the canopy. She asks her two daughters-in-law, telling them: "Just prop up my two eyes with that iron bar, which weighs twelve hundred pounds, so that I may look around." The great size of this bar shows us how tenaciously the truth regarding the immensity of the old hag lived on.

Her two daughters-in-law then took the twelve-hundred-pound iron bar and opened the old woman's eyes; then she spoke thuswise: 'If that cursed Nicholas Little has killed my two sons, I will turn into a mouth, one jaw of which will be on the earth and the other I will throw to the sky, so as to catch that cursed villain and his two brothers, and grind them as mill-stones grind wheat.'

The dragon's wives changed themselves into other objects. The first became a bubbling water, but Nicholas recognized her and killed her; the second became a fruit tree; but Nicholas also recognized her and killed her.

Jeremiah Curtin says: "Now they journeyed and travelled through forty-nine kingdoms, till at last Miklos saw from a distance that an unmercifully great mouth, one jaw of which was on earth and the other thrown up to the heavens, was nearing them like the swiftest storm, so that they had barely time left to run into the door of the Lead Friend's house. And a thousandfold was their luck that they got in; for the unmercifully great mouth stood before the threshold of the Lead Friend, so that whoever should go out would fall into it, and be swallowed that minute."

To make a long story short in the telling, Lead Friend and Nicholas poured eighteen tons of boiling lead into the old witch's mouth and burned out her stomach. But after doing this, Lead-Melting Friend, like Eurystheus in the Hercules myth, kept Nicholas under his power until he should perform the labors connected with bringing the Green Daughter of the Green King to him.

The other two sons returned home. Curtin says: "Then they let out the steed of the bright moon and the steed of the shining sun on the highway of the heavens, but both the moon and the sun shone sadly. For this reason they shone sadly: that he was without merited reward who had really freed them from the dragons, for Kiss Miklos (Nicholas) was now in never-ending slavery to the Lead Friend.

"Once the Lead Friend called Miklos and found this to tell him: 'Well, Miklos, if thou wilt bring me the Green Daughter of the Green King, I will let thee go free, and I will strike from thee the three-hundred-pound ring and the twelve-hundred-pound chain. Therefore, good friend Miklos, I advise thee to start in the morning with the bright shining sun, and bring me my heart's desire.'"

After many labors and the use of great magic, Nicholas secured the Green Daughter, but desiring her for himself, they then contrived to find Lead Friend's life, which he did

not carry in his own person. This they took from him and thus obtained their freedom.

The clear sky, the personification of which was our hero, was now freed, so he and his wife immediately started for home. "Now, the shining sun had shone so sadly, and the bright moon had beamed so sadly, that it could not be more so; but the moment they beheld Miklos and his wife in the chariot of glass and gold, the bright sun shone joyously, and so did the clear moon."⁵

In the above skazka it is stated that Lead Friend does not carry his life in his own person. Koshchéi the Deathless has like immutability. He is merely one of the many incarnations of the spirit of the great dark canopy-belt. Sometimes he is described as altogether serpent-like. His life to the ancients seemed to be apart from the manifestation of his being, and therefore from their viewpoint he could not be killed until this hiding-place should be broken into and the true sun should appear.

To illustrate that the death of the canopy appeared to be, not in itself, but that it was conquered by Ivan the sun, we give an abridgment and interpretation of the skazka of Koshchéi Without-Death as follows:

"Ivan Tsarevich was a precocious infant that would not go to sleep unless rocked by his father the Tsar, who, speaking to him, would say: 'Sleep, little son, sleep, and when thou art grown up a man I will get thee Peerless Beauty as bride.' The Tsarevich would then fall asleep and sleep three days and three nights at a time. This happened three times, and then, waking up, he asked his father's blessing, saying: 'I am going forth to marry.' The father replied: 'Whither canst thou go? Thou art but nine days of age in all.'"

Ivan, having been thus cradled and rocked in the canopy,

⁵ Jeremiah Curtin, "Myths and Folk Tales of the Russians, Western Slavs, and Magyrs," pp. 475-516. Afanasyeff, "*Narodiya Russkiya Skazki*," part i, p. 1. In the original, "The Lead Friend."

was indeed a very active hero. He procured for himself, as all good sun-heroes should, a magic horse, and forthwith sallied out into the white world to find Peerless Beauty as bride. He rode far, far. The day was growing short, night was coming on. A house stood like a town; each room was a chamber. He tied his horse to a copper ring, went in to a sun-obscuring chamber and spent the night.

The next morning he rose early, rode far with distance, the day was shortening. There stood another house like a town, each room a chamber. He tied his horse to a silver ring, went in, spent the night in a sun-obscuring chamber. The third day and night passed in like manner, but at this last cloud mansion he tied his horse to a golden ring. Apparently these three rings were three different belts in the vapor cloud homes.

Next morning the old grandmother who furnished him the last night's lodging called all the fishes (fish-gods) of the great sea and all the animals of the land (gods-terrestrial) and asked them for information of Peerless Beauty, but the fishes and creatures could give no information. The birds were called and they also gave answer: "We have not seen her with sight, we have not heard her with hearing." They had just spoken when in came the Mogol bird, fell on the ground, and, as the tale says, "there was no light in the window."⁶ This great canopy-bird was a light extinguisher and knew all about Peerless Beauty. She took Ivan on her back, and as she flew she fed on the cloud-oxen and vessels of water.

⁶ In the Norka Skazka (Afanasyeff i, No. 6) a like bird is mentioned. The text reads, "Presently there came a bird flying—such a big one, that the light was blotted out by it. It had been dark there before, but now it became darker still." In the story of Usuiuya we have another instance of a great bird. "The Usuiuya Bird is a twelve-headed snake," says the text. "The monster is not so much a bird as a flying dragon." He stole the golden apples (stars) from a monarch's garden (the egg-hole of the north), but was killed by Ivan (the sun). Erlenwein No. 41.

To make a long story short in the telling, he obtained Peerless Beauty, and was returning with her, but, being wearied, he lay down to sleep, and slept exactly nine days and nights. Meanwhile Koshchéi Without-Death bore away Peerless Beauty to his own kingdom.

It will be noted that the time-periods of the infant sun's slumbers amounts to the same total as this later instance; it is therefore natural to find that when he awoke he had to do his work all over again. The routine of nature repeats itself.

He came to the kingdom of the Deathless one, now determined to find out where his death was. He asked Peerless Beauty to find out. Koshchéi fooled her once, fooled her twice, then he said unto her, "Oh, simple woman, I was joking with thee! My death is in an egg, the egg is in a duck, and the duck is in a stump floating on the sea."

When Koshchéi went off to war, Peerless Beauty baked cakes for Ivan Tsarevich, and told him where to look for the death of Koshchéi. He found it and returned to the canopy-darkened home of the Deathless. Koshchéi Without-Death was sitting at the window, cursing.

"'Oh, Ivan Tsarevich, thou wishest to take Peerless Beauty from me; and so thou wilt not live.'

"'Thou didst take her from me thyself,' answered Ivan Tsarevich, took the egg from his bosom, and showed it to Koshchéi. 'What is this?'

"The light grew dim in the eyes of Koshchéi; then he became mild and obedient. Ivan Tsarevich threw the egg from one hand to the other. Koshchéi Without-Death staggered from corner to corner. This seemed pleasant to the Tsarevich. He threw the egg more quickly from hand to hand, and broke it; then Koshchéi fell and died.

"Ivan Tsarevich attached the horses to his golden carriage, took whole bags filled with gold and silver, and went to his father."⁷

⁷ Curtin, "Myths and Folk-Tales of the Russians, etc.," p. 106 ff. Afanasyeff pt. vii, p. 72.

It is not a stretch of our imagination that places this skazka in the ranks of the sun myths. Professor A. de Gubernatis sees in the duck the dawn, in the hare (which some of the variants of this story substitute for the log) the moon sacrificed in the morning, and in the egg the sun.⁸ This interpretation is in the right direction, but its author lacked the knowledge of the hypothesis under consideration. Ivan, the hidden sun, who rode on the magic-steed, brought into the presence of a darkened world the true sun, the egg, and forthwith Koshchéi, the serpent, died.

W. R. S. Ralston, of the British Museum, says: "In one of the descriptions of Koshchéi's death, he is said to be killed by a blow on the forehead inflicted by the mysterious egg—that last link in the magic chain by which his life is darkly bound. In another version of the same story, but told of a Snake, the fatal blow is struck by a small stone found in the yolk of an egg, which is inside a duck, which is inside a hare, which is on an island (*i.e.*, the fabulous island Buyan). In another variant Koshchéi attempts to deceive his fair captive, pretending that his 'death' resides in a besom, or in a fence, both of which she adorns with gold in token of her love. Then he confesses that his 'death' really lies in an egg, inside a duck, inside a log which is floating on the sea. Prince Ivan gets hold of the egg and shifts it from one hand to the other. Koshchéi rushes wildly from side to side of the room. At last the prince breaks the egg. Koshchéi falls on the floor and dies."

Our author goes on to say: "This heart-breaking episode occurs in the folk-tales of many lands. It may not be amiss to trace it through some of its forms. In a Norse story a Giant's heart lies in an egg, inside a duck, which swims in a well, in a church, on an island. With this may be compared another Norse tale, in which a *Haugebasse*, or Troll, who has carried off a princess, informs her that he and all his companions will burst asunder when above them passes

⁸ "Zoölogical Mythology," i, 269.

‘the grain of sand that lies under the ninth tongue in the ninth head’ of a certain dead dragon. The grain of sand is found and brought, and the result is that the whole of the monstrous brood of Trolls or *Haugebasser* is instantaneously destroyed. In a Transylvanian-Saxon story a Witch’s ‘life’ is a light which burns in an egg, inside a duck, which swims on a pond, inside a mountain, and she dies when it is put out. In the Bohemian story of ‘The Sun-horse’ a Warlock’s ‘strength’ lies in an egg, which is within a duck, which is within a stag, which is under a tree. A Seer finds the egg and sucks it. Then the Warlock becomes as weak as a child, ‘for all his strength had passed into the Seer.’ In the Gaelic story of ‘The Sea-Maiden,’ the ‘great beast with three heads,’ which haunts the loch cannot be killed until an egg is broken, which is in the mouth of a trout which springs out of a crow, which flies out of a hind, which lives on an island in the middle of the loch. In a Modern Greek tale the life of a dragon or other baleful being comes to an end simultaneously with the lives of three pigeons which are shut up in an all but inaccessible chamber, or inclosed within a wild boar. Closely connected with the Greek tale is the Servian story of the dragon whose ‘strength’ (*snaga*) lies in a sparrow, which is inside a dove, inside a hare, inside a boar, inside a dragon (*ajdaya*) which is in a lake, near a royal city. The hero of the story fights the dragon of the lake, and after a long struggle, being invigorated at the critical moment by a kiss which the heroine imprints on his forehead, he flings it high in the air. When it falls to the ground it breaks in pieces, and out comes the boar. Eventually the hero seizes the sparrow and wrings its neck, but not before he has obtained from it the charm necessary for the recovery of his missing brothers and a number of other victims of the dragon’s cruelty.”⁹

⁹ “Russian Fairy Tales and Muscovite Folk Lore,” chap. ii, Mythological.

Another tale telling of a rescue is told of how Mirko, the king's son, went forth to battle with the overpowering enemies of his father's friend, the Hero of the Plain; succoring him, he brought him to his sire in triumph. The tale is so full of the romance of the sky that we give it as follows:

To begin with, like Nicholas Little, Mirko also came into possession of a magic mare. When she had eaten the glowing coals of the sun, she became such a golden-haired steed as the Star of the Dawn. On this creature Mirko passed over the copper, silver, and golden bridges of the sky, beyond this they climbed the summitless, high glass mountain and forthwith they crossed that very mountain.

The horse stamped, and said, 'Open thy eyes master! What dost thou see?' "'I see,' said Mirko, 'when I look behind, something dark, as large as a great plate.'

"'Oh, my master, that is the round of the earth. But what dost thou see before thee?'

"'I see a narrow glass road, rising like a half circle. On both sides of it is emptiness of bottomless depth.'

"'My dear master, we must pass over that road; but the passage is so delicate that if one of my feet slip the least bit to one side or the other, there is an end to our lives. But trust thyself to me, and close thy eyes. Hold fast, I will manage.'

"With that she swept on, and in an instant stamped again. 'Open thy eyes! What dost thou see?'

"'I see behind me,' said Mirko, 'a faint light; in front of me is darkness so dense that when I hold my finger before my eyes I cannot see it.'

"'Well, we must go through that also; shut thy eyes and hold firmly.'

"She sped on anew, and again stamped. 'Open thy eyes! What dost thou see now?'

"'I see,' said Mirko, 'the most glorious, light, beautiful,

snow-covered mountains, and in the midst of them a silken meadow; in the centre of the silken meadow something dark.'

" 'This silken meadow,' said the steed, 'belongs to the Hero of the Plain; and the dark object in the middle is his tent, woven from black silk. Now close thy eyes or not as may please thee. We shall go there directly.' Mirko spurred the steed, and they were at the tent in a twinkling." * * *

The Hero of the Plain said: " 'This great silken meadow which thou seest is every day filled with enemies, and every day I cut them down; but to-day as thou art with me, we shall not hurry. Come, let us eat and drink; let them crowd.' Then the two went in, ate and drank till the enemy had so increased that they reached almost to the tent. The Hero of the Plain sprang then to his feet and said: 'Up, my comrade, we'll soon finish.' Both leaped into their saddles and rushed to the centre of the enemy, crying out, 'Sword from the sheath!' The swords hewed off the heads of the countless multitude, so there was scarcely room to move for bodies. Twelve of the opposing warriors now flee from the rear, the Hero of the Plain and Mirko pursuing. They come to a glass mountain where there is a nice, level space; he sees them running upon it. He gallops after them; but all at once they are as if the ground had swallowed them. Mirko springs to the place where they disappear, finds a breach and a deep opening with winding steps. His steed rushes into the opening and down the stairs; they are soon in the lower world (lower canopy region).

"Mirko looks around the lower world and sees a shining diamond castle, which serves instead of the sun down there. The twelve fleeing warriors rush towards the castle, he after them, and, ordering his sword out of the sheath, cuts off their heads in a moment. The next instant Mirko stands before the diamond castle. Within, there is such a clatter and pounding that the whole interior trembles and shivers. He dismounts and enters. Inside is an old witch weaving,

and the racket is deafening. The building is full of armed men. The infernal old witch weaves them. When she throws her shuttle to the right, two hussars spring out on horseback; when she throws it to the left, two men on foot jump out armed.

“Meanwhile Sword out of the Sheath cuts down the newly made soldiers, but the old witch weaves more. (She is a canopy ever giving birth to new clouds.) ‘Well,’ thinks Mirko to himself, ‘I shall never get out of here, at this rate;’ but he commands the sword, and it cuts the old witch into small pieces (which shows that it was a good sun-shaft). Then he carries the loom into the yard, where there is a pile. He throws everything on the pile and sets fire to it; but when all is burned one of the old witch’s ribs springs out, begins to turn round in the dust, and she rises up again entire. * * *

“‘If I leave the old witch alive, she will put up her loom again, and the Hero of the Plain will never be able to free himself from his enemies.’ Again he orders his sword to cut the old witch in pieces; he throws the pieces into the fire, where they are consumed, so that she can never rise again. (This scene is identical with the burning heavens at Ragnarok.) He mounts his steed and searches the underground world, but nowhere does he find a living soul.

“Then he puts spurs to his steed, springs up the circular stairs, and issues forth into the upper world. Straightway he comes down from the glass mountain, and, passing over the silken meadow, returns to the Hero of the Plain, who thought Mirko had left him. But when he saw his friend returning, he went out to meet him with great joy, and took him into the tent, where they feasted together gloriously. And when the prince rose to go, he offered him his silken meadow and all the royal domains; but Mirko answered: ‘My dear elder brother, I have finished thy enemies; they will never attack thy kingdom again. I have this now to ask,

that thou come with me to my father the king, who has long been waiting for thee.' * * *

"At that time the old king was sitting at the window of his palace next the rising sun, and lo! he beholds two horsemen riding towards him. Straightway he takes his field-glass, and sees that it is his trusty old comrade, the Hero of the Plain, together with his son Mirko. He runs out, and from the tower commands that a twelve-year-old ox be killed; and when Mirko and the Hero arrive, the great feast is ready. He receives them with joy, kisses and embraces them; this time both his eyes are laughing. Then they sat down to the feast, ate and drank with gladness. Meanwhile the Hero of the Plain spoke of Mirko's doings, and, among other things, said to the old king: 'Well, comrade, thy son Mirko will be a better hero than we were; he is already a gallant youth. Thou hast cause to rejoice in him.'"¹⁰

There is no questioning of the fact that this class of skazkas belong to the sun-myths. One of them even bears the evidence in its title. It is called "The Witch and the Sun's Sister." It begins with an account of Ivan fleeing from his witch-sister (another name for Koshchéi, the canopy). Of course she followed him.

Before proceeding, it may be well to remark that this incident is common to nearly all the sun-myths; thus in the skazka of Koshchéi the Deathless, after Ivan had carried away Peerless Beauty, the Deathless one followed them and carried her away as Ivan slept. Again, in the legend of "The Green Daughter of the Green King" the daughter herself on the homeward way plays tricks, some of which are as follows: "The Green Daughter of the Green King beckoned Miklos to her and asked him: 'Hei! my heart's beautiful love, renowned Kiss Miklos, tell me, on thy true soul, art thou taking me for thyself or for another? If thou

¹⁰ "Myths and Folk-Tales of the Russians, etc.," pp. 434-448. Afanasyeff's collection, pt. i, p. 436.

art not taking me for thyself, I will play tricks with thee.'

" 'I am taking thee for myself; I am taking thee for another,' answered Kiss Miklos.

Well, no more was said. Once, when turning and winding, they look in the coach; it is empty. The beautiful girl is gone. In a moment they stop, search the coach, but find her nowhere.

" 'Here, good friend Far Seer,' said Kiss Miklos, 'look around! Whither has our beautiful bird flown?'

" Far Seer did n't let that be said twice. In the turn of an eye he surveyed the round earth, but he saw not the beautiful maiden.

" 'She is not on the dry earth,' said Far Seer.

" 'Look into the sea,' said Kiss Miklos.

" Far Seer surveyed the deep sea, and saw her hiding in the belly of a three-pound whale, near the opposite shore of the sea.

" 'Ah, I see where she is!'

" 'Where?' asked Miklos.

" 'Hidden in the belly of a three-pound whale.'

" 'Here, good friend Great Drinker,' said Miklos, 'come hither, and drink up the water of this deep sea!'

" Great Drinker was not slow. He lay face under by the sea, and with three draughts drank up all the water (evaporation drinking up the vapor-belt). The three-pound whale was lying then in a bay near the opposite shore.

" 'Now, good brother Swift Runner,' said Kiss Miklos, 'step out and bring me that three-pound whale which is lying near the opposite shore.'

" Swift Runner rushed in a moment across the bottom of the sea, and brought back the three-pound whale. Miklos opened the whale, took out its stomach, cut it carefully, and out fell the Green Daughter of the Green King. Then he seated her in the coach, and they drove on."

This was not the only effort put forth by the Green

Daughter to escape. They looked into the six-horse canopy coach, and she was not there. Far Seer was called and he discovered her in her own home, "in the very centre of the garden, hidden on the highest top of an apple-tree, in the middle of a ripe red apple." Swift Runner was sent and fetched the apple, or star, containing her. Kiss Miklos seated her in the coach, and they fared farther.¹¹

But to return from this digression to the skazka of "The Witch and the Sun's Sister": "Prince Ivan heard a loud noise and looked back. There was his sister chasing him. So he waved his handkerchief, and a deep lake lay behind him. While the witch was swimming across the water, Prince Ivan got a long way ahead. But on she came faster than ever; and now she was close at hand! Vertodub (a cloud-giant) guessed that the Prince was trying to escape from his sister, so he began tearing up oaks and strewing them across the road (heaped up the world-tree). A regular mountain did he pile up! There was no passing by for the witch! So she set to work to clear the way. She gnawed, and gnawed, and at length contrived by hard work to bore her way through; but by this time Prince Ivan was far ahead.

"On she dashed in pursuit, chased and chased. Just a little more and it would be impossible for him to escape. But Vertogor (another cloud-giant) spied the witch, laid hold of the very highest of all the mountains, pitched it down all of a heap on the road, and flung another mountain right on top of it. While the witch was climbing and clambering, Prince Ivan rode, and found himself a long way ahead. At last the witch got across the mountain, and once more set off in pursuit of her brother. By-and-by she caught sight of him, and exclaimed:

"'You shan't get away from me this time!' And now she is close, now she is just going to catch him!

¹¹ Curtin, "Myths and Folk-Tales, etc.," pp. 501-504.

"At that very moment Prince Ivan dashed up to the abode of the Sun's Sister and cried:

"'Sun, Sun! open the window!' ('Old sun canopy-shiner open a hole!').

"The Sun's sister opened the window, and the Prince bounded through it, horse and all.

"Then the witch began to ask that her brother might be given up to her for punishment. The Sun's Sister would not listen to her, nor would she give him up. Then the witch said:

"'Let Prince Ivan be weighed against me, to see which is the heavier. If I am, then I will eat him; but if he is, then let him kill me.'

"This was done. Prince Ivan was the first to get into one of the scales; then the witch began to get into the other. But no sooner had she set foot in it than up shot Prince Ivan in the air, and that with such force that he flew right up into the sky, and into the chamber of the Sun's Sister.

"But as for the Witch-Snake, she remained down below on earth."¹²

The Sun's Sister may be identified with a bright upper cloud-belt, and because she is bright she is the true sister of Ivan the sun. In the dawn the Witch-Snake, or false sister, steps into the lower heavens, which are the mythical pair of scales, and forthwith the sun flies up into his true sister's shining abode.

In the Russian skazkas these palaces of the canopy frequently contain hidden or forbidden chambers from which sky-scenes are released by the sun-heroes. The Tale of "Yelena the Wise" is of this character. Usually the hero and heroine are chased by the parent canopy, which is the captor in the cases above cited. Ralston gives a number of instances of a like nature, from which we select the following:

¹² W. R. S. Ralston, "Russian Fairy Tales," chap. ii, Mythological.

"The story of Immortal Koshchéi is one of frequent occurrence, the different versions maintaining a unity of idea, but varying considerably in detail. In one of them, in which Koshchéi's part is played by a Snake, the hero's sisters are carried off by their feathered admirers without his leave being asked—an omission for which a full apology is afterwards made. In another, the history of 'Fedor Tugarin and Anastasia the Fair,' the hero's three sisters are wooed and won, not by the Falcon, the Eagle, and the Raven, but by the Wind, the Hail, and the Thunder. (*Modern storm heroes supplanted the old canopy warriors.*) He himself marries the terrible heroine Anastasia the Fair, in the forbidden chamber of whose palace he finds a snake hung up by one of the ribs. He gives it a lift and it gets free from its hook and flies away, carrying off Anastasia the Fair. Fedor eventually finds her, escapes with her on a magic foal which he obtains, thanks to the aid of grateful wolves, bees, and crayfish, and destroys the snake by striking it 'on the forehead' with the stone which was destined to be its death. In a third version of the story, the hero finds in the forbidden chamber 'Koshchéi the Deathless, in a caldron amid flames, boiling in pitch.' There he has been, he declares, for fifteen years, having been lured there by the beauty of Anastasia the Fair. In a fourth, in which the hero's three sisters marry three beggars, who turn out to be snakes with twenty, thirty, and forty heads apiece, Koshchéi is found in the forbidden chamber, seated on a horse which is chained to a caldron. He begs the hero to unloose the horse, promising, in return, to save him from three deaths."¹³

It has been shown that Koshchéi was the personified canopy-belt. In one skazka, he is even called a snake. Now, when the sun first appeared as a dim light in this blanket, no doubt it was thought to be a part of the same cloud-being, the soul or life as it were of Koshchéi the Deathless; then as the

¹³ *Ibid.*

orb of day came into clearer view it was a horse chained to the caldron of flame and heat. Later developments disclosed the fact that the sun was not a part of the old canopy, and the accepted stories had to be recast with the sun as a separate hero, making war on the decrepit serpent. Ralston says:

“All the monstrous forms which figure in the stories we have just been considering appear to be merely different species of the great serpent family. Such names as Koshchēi, Chudo, Yudo, Usuinya, and the like, seem to admit of exchange at the will of the story-teller with that of Zmēi Goruinuich, the many-headed Snake, who in Russian story-land is represented as the type of all that is evil.”¹⁴ An evil canopy was an evil thing indeed!

Another name given to such a canopy or snake was ‘Baba Yaga.’ One of these canopy mothers ordered a servant to swing the cradle of her infant son. The Baba Yaga’s children were horrible creatures, but this maid performed her task faithfully, so the old woman sent her home with a blue coffer filled with money. The bright-colored blue canopy brought the greenhouse conditions along with plenty on the earth beneath. Another servant followed, did badly, and was dismissed with a red-coffer, out of which issued fire. The good canopy had turned evil. Ragnarok, or the day when the canopy had descended into the atmospheric region and appeared bloody red, had arrived.

The evil Baba Yagas brought on the Ice age. One of these individuals is represented in the skazkas as petrifying her victims,¹⁵ which trait connects her with Medusa. There were three sister Baba Yagas that may be likened to the three Gorgons.

Vasilissa, or “Golden Tress,” was visiting one of these creatures, and it appears that she wanted to grow wise. To

¹⁴ *Ibid.*

¹⁵ Koshchēi’s name is said to be derived from ‘*kost*,’ a bone, whence comes a verb signifying to become ossified, petrified, or frozen. *Ibid.*

grow wise one must ask questions. "Ask away," the Baba Yaga said; "only it is n't every question that brings good. Get much to know, and old soon you'll grow."

"I only want to ask you, granny, about something I saw. As I was coming here, I was passed by one riding on a white horse; he was white himself, and dressed in white. Who was he?"

"That was my bright Day!" answered the Baba Yaga.

"Afterwards there passed me another rider, on a red horse; red himself, and all in red clothes. Who was he?"

"That was my red Sun!" answered the Baba Yaga.

"And who may be the black rider, granny, who passed by me just at your gate?"

"That was my dark Night; they are all trusty servants of mine."¹⁶

The following incident connected with a Baba Yaga occurs in the story of Mara-Moreнна. Prince Ivan, the sun, went to one of the old women to ask for a heroic steed. This seems natural, for if we put the question ourselves, where else could the sun go to in order to procure a vapor-arc or shell for his steed? The canopy-vapor, or Baba Yaga, alone could supply them. Ivan had to pass over this world-roof each day; it follows that he could get such a steed as he required only from her. She set him the task of watching her mares for three days, promising him the steed he desired if he brought them back safely to the stable. At the end of the appointed time, though he had performed the task successfully, a bee told him to steal a certain colt and depart in the night. As the story goes:

"The Baba Yaga went to sleep. In the dead of the night Prince Ivan stole the sorry colt, saddled it, jumped on its back, and galloped away to the fiery river. When he came to that river he waved the handkerchief three times on the

¹⁶ *Ibid.*

right hand, and suddenly, springing goodness knows whence, there hung across the river, high in the air, a splendid bridge. The Prince rode across the bridge and waved the handkerchief twice only on the left hand; there remained across the river a thin—ever so thin a bridge! ¹⁷

“When the Baba Yaga got up in the morning, the sorry colt was not to be seen! Off she set in pursuit. At full speed did she fly in her iron mortar, urging it on with the pestle, sweeping away her traces with the broom. She dashed up to the fiery river, gave a glance, and said, ‘A capital bridge!’ She drove on the bridge, but had got only half-way when the bridge broke in two, and the Baba Yaga went flop into the river. There truly did she meet with a cruel death!” ¹⁸ The appearance of the sun brought about the cruel death of the canopy. Heaven’s bridge fell under her.

Of the general character of the Russian snake, Ralston says: “His outline, like that of the cloud with which he is so frequently associated, and which he is often supposed to typify, is seldom well-defined. Now in one form and now in another, he glides a shifting shape, of which it is difficult to obtain a satisfactory view. * * *

“But in most cases he is a serpent which in outward appearance seems to differ from other ophidians only in being winged and polycephalous, the number of his heads generally varying from three to twelve. * * *

“In one story he appears to have stolen, or in some way concealed, the daylight; in another the bright moon and the many stars come forth from within him after his death.” ¹⁹

One of the skazkas embracing some of the above conceptions is as follows. It is entitled ‘Ivan Popyalof.’

“Now, in the land in which Ivan lived there was never

¹⁷ Irradiation made the annular bridge appear larger as the sun rode over it, just as the filament in the incandescent electric light seems to grow in size when the current is passing.

¹⁸ *Ibid.* ¹⁹ *Ibid.*

any day, but always night. This was a Snake's doing. Well, Ivan undertook to kill that Snake, so he said to his father, 'Father make me a mace five poods in weight.' And when he had got the mace he went out into the field and flung it straight up in the air, and then he went home. The next day he went out into the fields to the spot from which he had flung the mace on high, and stood there with his head thrown back. So when the mace fell down again it hit him on the forehead. And the mace broke in two.

"Ivan went home and said to his father, 'Father, make me another mace, a ten-pood one.' And when he had got it he went out into the fields and flung it aloft. And the mace went flying through the air for three days and three nights. On the fourth day Ivan went out to the same spot, and when the mace came tumbling down he put his knee in the way, and the mace broke over it into three pieces.

"Ivan went home and told his father to make him a third mace, one of fifteen poods weight. And when he had got it, he went out into the fields and flung it aloft. And the mace was up in the air six days. On the seventh Ivan went to the same spot as before. Down fell the mace, and when it struck Ivan's forehead, the forehead bowed under it. Thereupon he said, 'This mace will do for the Snake.' ²⁰ * * *

"Presently there rode up a Snake with three heads. His steed stumbled, his hound howled, his falcon clamored. Then cried the Snake:

"'Wherefore hast thou stumbled, O Steed? hast thou howled, O Hound? hast thou clamored, O Falcon?'

"'How can I but stumble,' replied the Steed, 'when under the boarding sits Ivan Popyalof?'

"Then said the Snake, 'Come forth, Ivanushka! Let us try our strength together.' Ivan came forth, and they

²⁰ This is the same weapon as the magic cudgel found in so many of the Slavonic folk-tales. It is a kind of degraded form of the myths which tell of the hammer of Thor and the lance of Indra.

began to fight. And Ivan killed the Snake, and then sat down again beneath the boarding.

"Presently there came another Snake, a six-headed one, and him, too, Ivan killed. And then there came a third, which had twelve heads. Well, Ivan began to fight with him, and lopped off nine of his heads. The Snake had no strength left in him. Just then a raven came flying by, and it croaked:

" 'Krof! Krof!'

"Then the Snake cried to the Raven, 'Fly, and tell my wife to come and devour Ivan Popyalof.'

"But Ivan cried: 'Fly, and tell my brothers ²¹ to come, and then we will kill this Snake, and give his flesh to thee.'

"And the Raven gave ear to what Ivan said, and flew to his brothers and began to croak above their heads. The brothers awoke, and when they heard the cry of the Raven, they hastened to their brother's aid. And they killed the Snake, and then, having taken his heads, they went into his hut and destroyed them. And immediately there was bright light throughout the whole land. * * *

"After killing the Snake's daughters, Ivan and his brothers went on homewards. Presently came the Snake's Wife flying after them, and she opened her jaws from the sky to the earth, and tried to swallow up Ivan. But Ivan and his brothers threw three poods of salt into her mouth. She swallowed the salt, thinking it was Ivan Popyalof, but afterwards—when she had tasted the salt, and found out it was not Ivan—she flew after him again." ²² And again the battle with the canopy was renewed.

The Skazka of Ivan Buikovich contains a variant of a part of this story. The name Buikovich means 'Bull's son.' ²³ In this story, however, "the dragon which the

²¹ Mock-suns, halos.

²² *Ibid.*

²³ Afanasyeff, vol. vii, p. 3.

Slavonic St. George kills is called, not a snake, but a Chudo-Yudo. Ivan watches one night while his brothers sleep. Presently up rises 'a six-headed Chudo-Yudo,' which he easily kills. The next night he slays, but with more difficulty, a nine-headed specimen of the same family. On the third night appears 'a twelve-headed Chudo-Yudo,' mounted on a horse 'with twelve wings, its coat of silver, its mane and tail of gold.' Ivan lops off three of the monster's heads, but they, like those of the Lernæan Hydra, become reattached to their necks at the touch of their owner's 'fiery finger.' * * *

"Presently Ivan smites off six of his antagonist's heads, but they grow again as before. * * *

"His brothers awake, and hasten to his aid, and the Chudo-Yudo is destroyed. The 'Chudo-Yudo wives,' as the widows of the three monsters are called, then proceed to play the parts attributed in 'Ivan Popylof' to the Snake's daughters." ²⁴

Children of the parent snake, the great world-environing cloud-belt, are common in the tales of all peoples, tongues, and nations. Persia represents the good and the evil principles of life by two serpents. Cashmere, it is said, had at least seven hundred places where this vapor-creature in some form or another was worshiped. China is the kingdom of the serpent, over which floats the 'Dragon-flag.' On the pots and clothing of its humblest citizen the original sky-serpent's children are found.

How shall we account for this universal and persistent worship of a creature neither beautiful, wise, nor beneficent, if we do not accept the hypothesis under consideration? Hindustan gave to the worship of this creature a grim and awful power. The merciless Juggernaut is a seven-headed dragon descendant of the old original sky-parent, and in that

²⁴ W. R. S. Ralston, "Russian Fairy Tales, etc.," ch. ii, Mythological.

country the fifth day of the month Srvana is still sacred to those gods which bear the form and manner of serpents.

In the Egyptian, Greek, and Roman mythologies the prominence given to the serpent may well startle the uninitiated. In our next chapter the most marvelous of all the accounts, the history of the Midgard Serpent, will be set forth. In the Old Testament the serpent and his children lived as a part of the story of sorrow. Out of the serpent's root has come forth a cockatrice, or adder, and his fruit has been a fiery flying serpent.²⁵

In America the traces of the universal 'trail of the serpent' is equally prominent, as we have just seen in our last chapter. Mexico and Peru had their serpent gods, and the cult had deteriorated to that extent that human sacrifice was offered. The great mounds of Ohio and Iowa are really serpent images. Purchase in his 'Pilgrimage' found among the Virginian Indians the snake head-dress of their priests to be almost similar to those worn by the priests of Isis and Bacchus.

To this may be appended the remark—Yes, serpent worship has girded the earth, even as the prototype did of old!

²⁵ Isa. xiv: 29.

CHAPTER XXII

SCANDINAVIAN MYTHS

THE Scandinavians in a fuller sense than any other people seem to have realized that their gods were dead. The priestly influence in the other nations endeavored to keep alive the children of the serpent, but the free life of the northern races had schooled them to observe nature and think for themselves, therefore it was not so easy to dictate to them. They knew that their gods were dead. Ragnarok was followed by regeneration.

Since little effort was made to keep the system alive, the tales of this land have suffered less by interpolations than any other. The missionaries of a new religion have always endeavored to blend the old things in with the new, in order to make it easier for their recruits to accept their way of thinking. Scandinavian mythology did not suffer from this source until the introduction of Christianity. As a result, the drama of the ages is perhaps more clearly set forth by the Nature myths of our ancestors than by any other people.

"Surely it seems a very strange-looking thing, this Paganism," says Carlyle; "almost inconceivable to us in these days. A bewildering, inextricable jungle of delusions, confusions, falsehoods, and absurdities, covering the whole field of life! A thing that fills us with astonishment; almost, if it were possible, with incredulity—for truly it is not easy to understand that sane men could ever calmly, with their eyes open, believe and live by such a set of doctrines." A little reflection tells us that it is true, they could not have so lived; neither, according to the words of our author, could they have "fashioned for themselves such a distracted chaos of hallucinations by way of Theory of the Universe." From

the standpoint of the old interpretation of mythology, as our author says, "it all looks like an incredible fable."¹

As intimated above, our ancestors have left us not only a theogony, or birth of the gods, but also a theoktony, or death of the gods. The Babylonians and Greeks saw their gods gradually drift away northwards. The Scandinavians, since they lived nearer the last scene, actually saw their downfall. No wonder their myths are sterner and more rigorous!

Five acts unfold the various stages of canopy decline as recognized by this northern mythology: First—The mother of creation, the canopy from whence all new things seemed to emanate. Second—The time preceding Baldur's death, which was the golden age under the greenhouse roof. Third—The death-scene of Baldur, the sun-lit shiner. Fourth—The time of transition immediately after Baldur's death. Fifth—The last time, Ragnarok, 'The Twilight of the Gods,' when the skies fell and all things were made anew.

Not only is the Scandinavian record of the order of events connected with canopy decline preserved in truer chronological sequence, but their cosmological scheme also is purer and of a far finer texture. Nine worlds are located in their plan of the universe. But it must be remembered that the universe as they knew it was our earth and its swaddling-bands of dust, gas, and vapor, with which it was bound roundabout.

Of the nine worlds the highest of all was Asgard, the home of the Æsir. There were twelve of these gods. Odin was the thirteenth. He was called the 'All-father,' and his throne rose above the other twelve.

Asgard was the snowy summit of the cloud-canopy, the Olympus of Northern mythology. Above it, the records say, was stretched the Bridge Bifrost. Now, it may be well to revert to the general principles on which this hypothesis is founded.

¹ "Heroes and Hero Worship," lecture i.

It is postulated that above the atmosphere there existed until quite recent times a very attenuated ring-blanket of fine planetesimal dust, accompanied by a gaseous envelope more or less divided into zonal belts. This upper structure was nearly transparent, and with the exception of the ring-blanket was invisible. The latter was the Bridge Bifrost.² It is further postulated that the upper structure was the immediate cause of all the peculiar cloud-phenomena in the atmosphere beneath.

Take the great Krakatoa Eruption in July and August, 1883, and see the lesson that it has taught us on the consti-

²After the old system of zonal-belts passed away and the new conditions came into existence Bifrost became associated with the rainbow. We may infer from this that the original structure had a very delicate appearance.

The Japanese speak of 'The Floating Region.' In their myth of creation the story runs that, "The sun, earth, and moon were still attached to each other like a head to the neck, or arms to the body. They were little by little separating, the parts joining them growing thinner and thinner. This part, like an isthmus, was called 'Heaven's Floating Bridge.'"

From Izanafi, the Creator's right eye, appeared Susa-noO, the 'Ruler of the Moon'; that is, of a crescent-vapor-arc. The account goes on to tell us that he had also a wonder-child named Amaterasu. This maiden was 'The Heaven Illuminating Spirit.' "At that time the distance between Heaven and earth was not very great, and he sent her up to the blue sky by the Heaven-uniting pillar, on which the heavens rested as on a prop. She easily mounted it, and lived in the sun (the shining canopy), illuminating the whole heavens and earth. The sun (the shiner, afterwards the true sun) now gradually separated from the earth, and both moved farther and farther, until they rested where they now are. Izanagi next spoke to Susa-noO, the Ruler of the Moon (crescent canopy arc), and said, 'Rule thou over the new-born earth, and the blue waste of the sea with its multitudinous salt waters.' * * * In sending her to her dominion (*i.e.*, present dominion after the vapor-canopy had thinned to such an extent as to show the true lunar orb through it), Izanagi gave her the necklace of precious stones from his neck, and told her to go up by way of the floating bridge. As the sun (canopy shiner) was then near, she ascended without difficulty." Frank S. Dobbins, "Gods and Devils of Mankind," pp. 308, 311, 312.

tution of our atmosphere. Before the occurrence, but few had the slightest suspicion that twenty miles over our heads a mighty tempest is incessantly hurrying with a speed much greater than the most awful hurricane. All that Krakatoa did was simply to provide the charges of dust by which for one brief period this wind was made visible. In the autumn of 1883 the newspapers were full of accounts of strange appearances in the heavens. These came from Ceylon, the West Indies, and other tropical places. All had the same tale to tell. All these phenomena were due to Krakatoa. It was in the late autumn that the marvelous series of celestial phenomena connected with the great eruption began to be displayed in our own country. Then it was that the glory of the ordinary sunsets was enhanced by a splendor which has dwelt in the memory of all those who were permitted to see it. The dust from Krakatoa produced this. Three times round went the glorified dust-cloud, and then drifted like the canopies of old towards the poles. What would it have done if it had been elevated to yet greater heights?

It is postulated that infalling planetesimal material from the upper structure, and vapors sucked up to far greater heights than can now be attained; floated in this border-land of the outer atmosphere. This was the first world of the Scandinavians, Asgard, the land of the Æsir. It is a matter of record that the celestial bridge touched the outer edge of the home of the gods. Sleipnir, Odin's marvelous sun-horse, used to rush unhesitatingly upon the bridge,³ which trembled

³ Other Scandinavian sun-horses were Glad (bright), Gyller (gilder or golden), Gler (the glassy, the shining one), Skeidbrimer (fleet-foot), Silfrintop (silver top), Gisl (the sunbeam), and Goldtop, Heimdall's steed of beauty, whose mane shone like the sun. Anderson's Norse Mythology, 6th ed., p. 189.

Along with these rapid ones may be mentioned Frey's boar, which, like the Boar of Erymanthus, which Hercules brought to his master, was a vapor-form. His golden bristles flashed in the sunlight, and he is said to have been so swift that Sleipnir with his eight legs could not outstride him.

beneath his weight. In other words, its flimsy material was seen to vibrate and quiver in the strong light of the sun.

The second world of the Scandinavians was Midgard, the world of men. The Midgard serpent was a clean-cut belt of cloud extending, like all these forms, east and west in the lower atmosphere; its contour being due to the zonal belts in the outer gaseous envelope. It is recorded that the river Ocean flowed around the world of men. In the original conception this Ocean river was the Midgard serpent, it was supposed to be united with the terrestrial ocean. Thus when Thor the storm or 'Thunder god' was in the hall of the giant Utgard-Loki, he was obliged to drink from a horn, large at the top, but exceedingly long, winding coil after coil to such a distance that the end could not be distinguished. Indeed, says the record, "the end of the horn which could not be seen reached to the great river." Thor drank so deeply that the men on Midgard thereafter called it the ebb of the tide.

The third world was Jötunheim, the upper giant world, which was said to be on the same plane as Ocean. The giant-cloud forms sometimes broke loose from the controlling zonal provinces, obscured the whole sky, and made war on the gods above. At the time of the end, commonly called Ragnarok, all zonal restraint was removed.

Norse mythology, like the mythologies of other lands, does not take much notice of regions not seen. The great under-world contained four more of the nine worlds, but these localities existed on the horizon, not beneath it. The world of the ancients was supposed to be flat, and it was not until later ages, when the gods had been swept away, and knowledge began to be diffused, that the idea of subterranean passages and cavities became general. These passages were finally introduced in order to account for the reappearance of the heavenly bodies each day in the east. Though not especially emphasized, northern mythology does mention

two worlds that were said to be lower still than the horizon-worlds. These were the land of subterranean fire, and the world of torture. From Surt's deep fiery dales the light of the midnight sun was reflected on the upper regions of the belted sky, hence since fire came from this direction these worlds were known to exist. The one was in the east and the other in the west.⁴

The four horizon-worlds were Mimir's Realm, Niflheim, Vanirheim, and the Realm of Urd.

Mimir's region was originally the eye-hole or open place in the northern sky, hence the beginning-place of the true sky scenes, but as time went on and the heavens cleared the east was seen to be the beginning-place, or birth-place, of the new scenes, hence confusion ensued and Mimir's Realm was said to be in the east.

Vanir's land was probably originally in the south, where another cloud-belt system was seen on the distant horizon. This land of the Vanir was the home of a noble race of gods akin to the Æsir.⁵

From the other two realms, which we believe were originally located in the east and the west, the great Ygdrasil's roots sprang high into the sky, the one from Urd's realm, the other from Niflheim. Niflheim, according to our deductions, was in the east. It was the lower giant-world, cold, dark, and misty. Urd's realm was in the west, the land of departing day, the kingdom of the dead.

The mighty ash-tree, Ygdrasil, was supposed to support the whole universe; its third root penetrated Asgard. This same thought permeates Greek mythology.

⁴ It is interesting to note that in some accounts the realm of Surt, instead of being the lowest, is said to be the highest world, topping even Asaheim. "Muspelheim," says Anderson, "the fire-world, is the highest Gimle (heaven)." Norse Mythology, 6th ed., p. 187. How could our ancestors tell where it was situated? Fire was seen in the highest regions, and yet again it seemed to come directly from below.

⁵ Another name given to the gods, which is very suggestive of their nature, is 'tivar,' the beaming ones.

"Thus the universe definitively organized by Zeus, with the assistance of Harmonia, was depicted by Pherecydes as an immense tree, furnished with wings to promote its rotary motion,—a tree whose roots were plunged into the abyss, and whose extended branches sustained the unfolded veil of the firmament, decorated with the types of all terrestrial and celestial forms." ⁶

"Everywhere," says Daniel G. Brinton, "we find traces of the world-tree, the primal growth which lifted man from his dark anterior dwelling-place, or from the earth to heaven. The Mbocobis of Paraguay tell of such a one which existed in the good old times, and by which the souls of the departed could climb commodiously to the delightful streams of Paradise; but a wicked old woman, angered at her luck in fishing in the celestial waters, changed herself into a rat and enviously gnawed the roots of the tree, so that it fell and could no more be raised." ⁷

The fact that this beautiful tree is supposed to have existed in the heavens is readily explained by the laws of perspective. To an observer, the striated or banded belts appearing to rise from beneath the horizon to the east or to the west necessarily appeared to diverge as the bands or belts ascended towards the zenith. Hence, to the imagination of man, the whole scene bore a decided resemblance to an immense tree, its trunk on the earth, its spreading branches overhead. We all know how the sun, moon, and stars when they approach the horizon are magnified by the increased thickness of the atmosphere through which we view them; so it was with the roots of Ygdrasil. No wonder that the ancients thought that the stumps were rooted on mother earth!

Such is the world-tree, or, as Ragozin says, "the majestic conception of the Cosmic Tree, which has its roots on earth

⁶ Lenormant, "Beginnings of History," p. 549.

⁷ "The Myths of the New World," 3d ed., p. 118.

and heaven for its crown, while its fruit are the golden apples—the stars, and Fire,—the red lightning (or rather reflected and refracted sunlight).

“All these suggestive and poetical fancies would in themselves suffice to make the tree-symbol a favorite one among so thoughtful and profound a people as the old Chaldeans. But there is something more. It is intimately connected with another tradition, common, in some form or other, to all nations who have attained a sufficiently high grade of culture to make their mark in the world—that of an original ancestral abode, beautiful, happy, and remote, a Paradise. It is usually imagined as a great mountain, watered by springs which become rivers, bearing one or more trees of wonderful properties and sacred character, and is considered as the principal residence of the gods.⁸

Again the tree is commonly associated with the serpent. The serpent and the tree! That is the conjunction we find in every race and every faith. Indeed, a serpent coiled at the root of a tree is the design found on one of the oldest Tyrian medals. They are united on the cylinder seals of Babylon and in the story of the fall of man in Genesis.⁹

The association of the thought of the world-tree with the cosmic mountain and the serpent fixes its place beyond question in the trestled sky over which Odin ruled. He was the All-canopy. His queen, enthroned by his side was Frigý, the loving canopy of the golden age. She, like all the canopies in the myths of other lands, was the mother of the

⁸“The Story of Chaldea,” 2d ed., ch. vi, p. 274, §9-10.

⁹“The inscriptions tell us of a primitive sacred garden, in which there was a tree of life. This tree is seen frequently on the seals of prominent personages of Babylon. It also appears among the Alabaster reliefs found on the wainscoting of the royal palaces. Approach to it seems to have been limited to the gods or to distinguished persons. Its fruit also contained qualities capable of granting and maintaining life perpetually.” Ira Maurice Price, “The Monuments and the Old Testament,” p. 88.

mighty gods. Her personified being moved about in a golden cart drawn by two cats in the familiar manner common to the halo-boats of Egypt, Babylon, and Greece.

Her husband sought wisdom from Mimir, and though some say he left his eye in pawn in her well-hole in exchange for his enlightenment, the old Rune-song of Saemund's Edda makes no mention of the sacrifice. If it be true, however, that the god suffered in this way, the meaning to be attached to the occurrence is that the All-canopy as it opened at the well revealed to the view of man a bright star which it was seen the All-father or canopy could never again recover.

At Mimir's well, in the cave-cloud-hole of the shining north the true sky was rendered visible by the lifting of the veil. Here the Alfadur (All-father) took a great draught of the water of revelation. The golden age was passing away, and Thor the young 'Thunderer,' Odin's son, was heard at times. This thunder never disturbed the Eden world, so its personified introduction shows a change was coming. In the fullest sense, Thor was the sky as we now see it, both clear and stormy.

Our forefathers saw all these changes coming, and, inasmuch as they involved the home of their gods, they felt that the denizens of the great canopy-deep must be fearfully concerned. Therefore in their stories of the events everything partakes of this coloring and they say when Odin returned from Mimir's well, a council of the gods was called to consider their impending doom. They also say that no car could carry the clear sky, Thor, to the summit of Mount Asgard to this council, so he was obliged to walk. It was also decreed that he should not walk over the Bridge Bifrost, the 'bridge of trembling,' so called. The other gods, however, were seen to float, as it were, to Asgard in their vapor-boats or shells. These were the hidden sun, the hidden moon and stars. But the clear sky had to walk there by himself,

and furthermore he had to wade through streams and across rivers in the silver sky sea. This is the record of the Elder Edda:

Kormt and Ormt,
And the two Kerlaugs;
These shall Thor wade
Every day,
When he goes to judge
Near the Ygdrasil ash;
For the Asa-bridge
Burns all ablaze—
The holy waters roar.”¹⁰

These rivers, Kormt and Ormt and the two Kerlaugs, were no doubt canopy streams which crisscrossed the bridge. It is a difficult matter to represent their perspective, especially in mythological language. Apparently they revolved not only in a lower sphere, but also in a slightly different plane, hence the canopy or bridge was at places eclipsed by them. The statement that, “Asa-bridge burns all ablaze” shows that the sky was becoming ruddy at times, indicating Ragnarok was indeed at hand.

But though at hand, the time had not yet fully come, so another great cloud-monster spread itself on the plane of the sky, which was spanned by the Midgard serpent, and people said of it, “The giants have deprived Thor of his power, they have stolen his hammer.” This was said because the Titan-clouds obscured the clear-sky from their upturned gaze. Thor now went out against the invaders, and not only recovered Mjolner, as the hammer was called, but also made the giant Thrym, who had stolen it, pay the penalty with his life.

Thomas Carlyle says in substance that the old name of the giant Thrym, Hrym, or Rime is now nearly obsolete in England, but that it is still used in Scotland to signify hoarfrost. Rime was not then, as now, a dead chemical thing, but a living Jötun, or Devil; the monstrous Jötun Rime

¹⁰ “Grimner’s Lay,” 29.

drove home his horses at night, sat combing their manes—which horses were Hail-clouds, or fleet Frost-winds.¹¹

To this interpretation it may be well to add that the effect of the Rime-cloud canopy was to produce a bitter chill on the earth; this frost afterwards came to bear the name of the giant who originally produced it.

Another one of the frost giants was named Hymir. His cows, the critics say, were icebergs. This myth has an affinity with those of the Hindus,—the cow Adumbra, 'licking the rime from the rocks,' has the hall-mark of being a nature myth portraying a cloud-bull licking the chill-black rime producing giant-invading zonal vapor rocks.¹² Hymir was the giant of the canopy sea, and a great, deep place he was. In order to brew their ale the gods sent Thor to procure from him his famous kettle, 'Mile-deep.' Snatching it from the giant, he placed it on his head, and immediately the true sky was hidden.

Naturally, the gods were thrown into great consternation every time their stronghold was assailed by the giants, or, to state it more scientifically, every time their domain was obscured from the sight of man by the breaking of the bonds of the zonal vapor-belt. It was said at such times that the giants were making war on the gods. The populace imagined their gods were thrown into great consternation.

At one of these times Baldur, the shining canopy whom everybody loved, and beneath whose greenhouse roof everything was verdant bright and beautiful,¹³ was slain by

¹¹ "Heroes and Hero-Worship."

¹² Brahma, Vishnu, and Siva possess attributes akin to those of the Scandinavian gods. Kishma destroying the serpent reminds us of Thor and his adventures with the Midgard serpent. The Thunder-god is more or less common to all lands. A cylinder-seal in the British Museum (No. 89,589) represents the good Marduk, armed with the thunderbolt, standing on the back of the serpent-monster Tīāmat and slaying her.

¹³ Baldur's Hall was called Breidablik, 'Hall-of-broad-shining-splendor.'

Hoder,¹⁴ the blind one, to wit, darkness, instigated by Loke, who was a go-between, a spirit akin to the evil hidden in the giant-canopy.¹⁵ Vali, the god of eternal light, brother of Baldur, slew Hoder and avenged his brother's death. The old conditions, however, were gone, therefore Hermond was sent to Hel to ask his return. Hermond went forth as Isis in Egypt went forth in search of her husband, Osiris, the dead sun-god.¹⁶ She rode on Sleipner, the sun-horse, and passed over the Gjallar bridge covered with glittering gold,¹⁷ which spanned the Gjøl River which flowed in Elivagar, near the gate of the horizon, at Hel's abode. She told Hel that all things in the world were grieving for the

¹⁴ Hoder's weapon was the mistletoe. The Nemean lion which Hercules slew was also proof against the weapons of this earth. As he was a sun-hiding canopy, no iron could pierce his side.

¹⁵ Some scholars argue that Loke is to be identified with Pluto of the Greeks, Siva of the Hindus, Ahriman, the evil one of the Persians, and also the devil of the Hebrew Bible. The old dragon of Rev. xx:1-2 still remains with us unbound. He lives throughout this age in myth, Rev. xii:15. When the gods chased Loke to punish him for causing Baldur's death, like Ea of Babylon he changed himself into a fish, a salmon, but, notwithstanding his cunning, he was captured in his own gill-net—the criss-cross, vapor, stringy, fluid sky. It is interesting to note that, like all the evil canopies, Loke was originally good. Poor says his name “comes from the word *lukos*, bright, and at first he meant mild warmth, and was all good. (“Sanskrit and its Kindred Literatures,” p. 280.) He became a kind of fallen angel.

¹⁶ The demon Set, or Seb, of Egypt comes to us as Surt of Scandinavia. Baal, the canopy fish-god of the south, is the Baldur of the north. What more is needed to prove that the nature marvels of the one land were the wonder talk of the other, and that both originated from the same sky-scenes?

¹⁷ The Gjallar bridge, like Bifrost, was a ring-belt circulating above the atmosphere. Owing to the intervening phenomena, it was only visible at or near the horizon, where it caught and reflected the sunlight from Surt's domain. Another like bridge was named Mundilfare. In no other place, known to man, than in the sky, can inanimate objects like a bridge have offspring. It is stated in the Younger Edda that Mundilfare had two children; they were Maane, the moon, and Sol, the sun. Sol married Glener, the shining one, which was another sun-lit sky-belt.

absence of the shining canopy.¹⁸ All things indeed were grieving, but the great, black canopy itself. The giantess (gygr), supposed to be no other than Loke Laufeyarson, refused. Because of this interception of light, Baldur naturally could not return.

His body is said to have been burned in the Ringhorn ship. How could language be more precise? Anderson says: "The tops of the mountains are the masts of this ship, which is round (ring) as the whirling world."¹⁹ The gods placed the beloved one's body on this ring-ship, and then desired to set it adrift, but it was so large that they were unable to move it. In this predicament they called upon a certain giantess named Hyrroken (the smoking fire), who came riding on a wolf, using twisted serpents for her reins. With a single push, this mighty personification shoved the ship forth. The ruddy glow of reflected light from its under surface was that of the appearance of fire. Smoking fire was at hand, Ragnarok the end.²⁰

In the legends of the Russians, a golden ship sails across the sea of heaven. It breaks into fragments, and none are able to put it together again. The custom of burning the bodies of the old sea kings originated as a memorial of this event. Boyesen has put it in song:

In the prow with head uplifted
 Stood the chief, like wrathful Thor;
 Through his locks, the snow-flakes drifted,
 Bleached their hue from gold to hoar,
 'Mid the crash of mast and rafter
 Norsemen leaped through death with laughter
 Up through Walhal's wide-flung door.

¹⁸ Weeping for Baldur and weeping for Tammuz are one and the same thing. Baldur's body was placed in a ship and burned. The sky opening was bloody-red. A survival of the custom is found in the Chinese day of weeping, which comes in mid-summer and is called the 'dragon boat festival.' The bewailing of Adonis was in memory of the same phenomenon.

¹⁹ "Norse Mythology," 6th ed., p. 295.

²⁰ *Ibid.*, p. 287.

The Marquis de Nadaillac notes how the practice of cremation suddenly became popular with our ancestors, but of course he is not aware of the cause. The Norsemen saw their gods cremated in the sky and in this way learned the lesson. The Marquis says:

“About the time of the beginning of the Bronze age, or perhaps even earlier, however, a remarkable change took place in the ideas of man, and the dead, instead of being buried intact, were consumed by fire on the funeral pile.

“What can have been the origin of this custom? What race first practiced it? It has long been supposed by many archæologists that it was the Aryans from the lofty Hindu Koosh Mountains, who first introduced into Europe a civilization more advanced than that which had hitherto obtained there, and taught the people to cremate instead of bury their dead. This theory was accepted for a considerable time without question, but of late years a new school, headed by Penka, has arisen, who claim that the reformers came not from the East, but from the North. The Marquis de Saporta had indeed before suggested that the primitive races who were the contemporaries of the mammoth and the rhinoceros came originally from the polar regions, where the remains of a luxuriant vegetation prove that climatic conditions prevailed in remote times of a very different character to those of the present day.”²¹

Skinblader (Frey's ship) was another famous canopy-arc. In it the gods sailed forth to the final conflict. Naglfar, Loke's ship, was even larger than Ringhorn.

Loke was the father of the Fenris-wolf, of the Midgard-serpent, and of Hel, all of which were god-obscuring canopy-forms. Tyr or Tiu²² gave his hand to the wolf as a pledge

²¹ “Prehistoric Peoples,” p. 366.

²² The etymology of the name Tiu or Zio identifies the god with the old Indo-European sky-god Dyaus, Zeus, Jupiter. Max Müller, “Lectures on the Science of Language,” 2d series, p. 425.

while the other gods were binding him. The wolf devoured it. Swallowed by the canopy, the god was said to have lost his hand. But the binding of the wolf could not hold the great black thing forever in check. At the last day he broke loose and overspread the heavens, devouring the sun or rather the swift sun, the canopy, the shining glass of Job xxxvii:18. While he was doing this his brother wolf or dog, Moongarm, as he is called, swallowed the moon.²³

By this time it will be seen that a large proportion of all the myths of Scandinavia portray the lower canopy or giant forms obscuring or devouring the zonal belt-bridges and other possessions and structures floating above the true atmosphere in the home of the gods.

One of these forms, like the Grecian account of Phaëton driving the chariot of the sun, brought great heat upon the region beneath. Now, the goddess Sif presided over the destinies of the earth, and when her grass was burnt up, people said, "Loke has burnt her hair, he has changed it into golden thread!"²⁴

²³ "A number of interpretations of Tyr's struggle with Fenrir, on the basis of nature-myths, have been proposed," says De La Saussaye, "but none of these is at all satisfactory." "The Religion of the Teutons," p. 247. Satisfactory explanations, we may add, follow the understanding of nature.

²⁴ Perhaps this is a wrong interpretation. Jeremiah Curtin says: "Hair in Indian mythology, as in other mythologies, is the equivalent of rays of light when connected with the sun and with planet luminaries." Then he gives as an illustration the song of the shirt of Waida Werris (the Polar Star):

The circuit of earth which you see,
The scattering of stars in the sky which you see,
All that is the place for my hair.

"Creation Myths of Primitive America," p. 516. This view seems more in harmony with the legend of the smithy of the dwarfs, where the bright golden hair of Sif was made. This smithy was evidently a sky scene, and from it the golden streamers of glowing hair were seen extending into the skies.

The end of the old conditions was close at hand, and another vapor-form was to follow which would produce the opposite effect. The picture is perfect; Odin stood with bowed head, for the Twilight of the Gods was now imminent, and prophesied as follows:

“The great Fimbul winter shall come, when snow shall fall from the four corners of heaven; deadly will be the frosts, and piercing the winds, and the darkened sun will impart no gladness. Three such winters shall come, and no summer to gladden the heart with sunshine. Then shall follow more winters, when even greater discord shall prevail. Fierce wolves shall devour the sun and moon, and the stars shall fall from heaven. The earth shall tremble, the stony hills shall be dashed together, giants shall totter, and dwarfs groan before their stony doors. Men shall seek the paths leading to the realms of death; and earth, in flames, shall sink beneath the seething ocean.”²⁵

Odin's ring, Draupner, from the verb meaning ‘to drop,’ for the reason that at stated periods new rings dropped from it, echoes this prophecy; each time a ring fell from it a fearful cold ensued.

Another legend fits in at this stage and advances the scene still closer to the time of the end. The gods, seeing that their days were limited, engaged a certain artificer to build for them a residence which was to be so strong that all the giants could not hope to drive them from its refuge. At Loke's suggestion, the wages they agreed to give the workman in consideration of the building being finished in a certain time was the goddess, Frey, the sun and the moon. The gods looked upon the whole matter as a joke, for they felt that no workman unaided could do such a task in so short a time, and it was stipulated that this strange being should be aided only by his horse. Great was the consternation of the gods

²⁵ Litchfield, “The Nine Worlds,” p. 153.

when they found their joke taking a serious turn and they came to realize that the edifice would be finished on time. The great horse was doing a stupendous amount of work, so the gods turned to Loke, the cause of all this mischief, and demanded that he rectify it. Now, one of the features of Loke reminds us of Œdipus, the slow-foot of Greek mythology. The physical feature connected with the whole story is that the canopy was settling down, falling and obscuring the sky. Only one cure would answer: faster speed was needed to whirl the canopy up higher into the sky; so the legend goes on to say that Loke changed himself into a mare and incited the strong workman's horse to run away. The artificer, seeing that he could not now complete his task in the time specified, cast off his veil and grew in size, that he might finish the building without the aid of his horse; but this revealed his true character, the gods saw that they were dealing with a mountain-giant and went immediately to battle with him. Thor cracked open his skull with his hammer. The clear sky did this, but the 'Twilight of the gods' was very near.

A legend of the clear sky tells how the charming Idun (blue-sky) with a basket of golden apples (stars) of youth was stolen by the giants. Summer gladness was carried off to the south, and the sun itself shone with a pale sickly light; all the gods began to grow old for want of the apples, and the time at hand was one great long dark night. Loke was sent to recover the fair one, but, after securing her, was chased by her captor, the giant Thjasse, who assumed the form of an eagle. The race was long and as they neared Asgard it looked as though the giant would overtake the fugitives, but once they had passed safely over the walls of their sky-home, the gods lighted chips; the eagle, unable to check his flight, burned his wings as he passed over, thus he fell dead in their midst. The sun, as though suddenly grown young, gleamed out in the radiance of his beauty, the crape-

ring turned into gold, and Gladsheim glittered again as of old. Idun, with her apples of youth, was in their midst again.

But as the end was now at hand the conditions above could not last. Ragnarok, or, as the word means, the darkness, the death of the gods, was now inevitable. The wolf Fenri burst his bonds and hurried gaping to the battle scene, with his lower jaw scraping the quaking earth, and his nose pointed high into the sky.

The great feature of the heavens now was its ruddy glow. The world-tree was burning.

Just mark the tree talks of mythology.
The world-ash covered all this earth of ours.
Apollo, the true sun, chased Daphne, the
Bright lovely nymph across the arching sky.
He cried for her to stay, but still she fled,
And when he caught her she changed to a tree.
The sun-beams catching in the vapors spread
And made an arbor of a tree-like growth.
The golden apples were the little stars,
And Hercules procured these by his strength.
The sun-god threw the canopy to earth
And thus obtained for them an open space.

Another tree tale in the south we find—
Osiris, the Egyptian sun-god strong,
Was placed within a chest, and then was thrown
Into the current of the sweeping stream.
The chest was washed ashore, then round it grew
A mighty tree, enclosing in itself
The coffin of the god, till Isis came
With thunder and with lightning to the spot.
Then, striking the great column with her wand,
She caused a split, and forth the coffin came.
She seized and then concealed it in a forest—
The sun was seen, and then was hid again.
And Typhon, the fierce monster, split it up.

In India another, similar tale describes a great tree held up by the Varuna-canopy. In the case of this tree the top was down and the roots up. "The Bright one was born of

the Dark one." Light from the clouds, it seems, the sunbeams being the roots. A mighty tree was this, with foliage queer!

The ash Ygdrasil was the tree-of-life; under its spreading arches the golden age existed physically for man. But he who worshiped the creature, to wit, the tree itself, partook of forbidden fruit. There was no life in the tree except in the type. He who saw this and worshiped God in spirit and in truth found in the tree a revelation, hence through the creature, or creation, he was led to the Creator, and in this way the tree became a means of life, spiritually.

Ancient tree worship was the perversion of God's way. There was the tree which stood on top of the pyramid (*i.e.*, the midnight shadow cone) in the island—birthplace (*i.e.*, the cave-hole) of the Aztec race. There was the tree referred to in the Hindu legends, etc., etc., but all alike are perversions. The three-pronged trident of Poseidon links the three roots of the world-ash to the water world of the overcast vapor-sky.

From Babylon and Syria the story is the same. The sacred tree is carved on many a stock and many a stone. A cylinder now in the British Museum shows the fall of man; a tree, a serpent, and two figures reaching for forbidden fruit.

The Bible is thus verified again.

Two trees are spoken of in Genesis;

The fruit of one is error born of snakes—

To worship the belt-system, and not God

Is what has been done since the Eden times

By nearly all the peoples of the earth.

To worship the true tree of promise, though

(The second tree which Genesis sets forth)

Is God's way and not man's way.

Let us see,

In type, He set before our infant race

The things of truth and life, but not of death,

He showed that all first things must pass away—

The canopy was good and yet it proved

To infant man that flesh and blood brought death.
Yea, first things had to perish to show this—
That God is Spirit. They that worship Him
Must worship in the spirit and in truth.²⁶
But our first parents worshiped what they saw,
So punishment was bound to follow swift.
The canopy was rent in twain to prove
It was the creature, not the Great Creator.
The flaming sword burst through and turned each way
To keep the tree of life, to show the truth,²⁷
On down the ages unto us poor mortals.

The way of death is error's first-born light;
The way of life is spirit and is truth.
Yea, light as learning is a dangerous thing
If little of it at a time be seen.
A little light is but a twilight dim,
And those who venture to go forth by it
May drop into a pitfall on the way.
A flood of light the whole truth makes all plain,
And those who wait on this will worship Him.
The way of life is spirit and is truth.
In Eden when the canopy was whole
The evidence was not yet all in hand.
Our parents worshiped only what they saw,
So God in judgment sent the sword to throw
More light upon His purpose for the world,
And Halcyon days were over then for man.
On through the ages new conditions stalked:
First ring, then canopy, then clear sky came.
The deluge of Deucalion brought down
A system—probably the last of all,
And never was the earth destroyed again.

“In the Egyptian history, as preserved by Plato, the Deluge of Deucalion, which many things prove to have been identical with the Deluge of Noah, was the last of a series of great catastrophes.

“In the Celtic legends the great Deluge of Ogyges preceded the last deluge.

²⁶ John iv:24.

²⁷ Gen. iii:24.

"In the American legends, mankind have been many times destroyed and as often renewed." ²⁸

Philosophers have noted these facts from a very early date. Thus, according to the Scriptural theory of comparative mythology, "Deucalion is only another name for Noah, Hercules for Samson, Arion for Jonah, etc. Sir Walter Raleigh, in his *History of the World*, says, 'Jubal, Tubal, and Tubal-Cain were Mercury, Vulcan, and Apollo, inventors of Pasturage, Smithing, and Music. The Dragon which kept the golden apples was the serpent that beguiled Eve. Nimrod's tower was the attempt of the Giants against Heaven.' " ²⁹

All those who have followed the argument as set forth by the hypothesis under consideration, however, see that a new element has been brought into the field, and it cannot be doubted that the Scriptures have revealed the truth (about nature's working) to man in all and through all past ages. The perversion of the type has ever been man's error.

After this long digression it behooves us to return to the matter of the burning of the world-ash. The furrowed sky had the semblance of a tree, and at the same time the appearance which connected it with the porcus-plowed field of the Hercules myth and with Frey's boar.

"In the legends of the Hindus we read of the fight between Rama, the sun-god (Ra was the Egyptian god of the sun), and Ravana, a giant who, accompanied by the Raks-hasas, or demons, made terrible times in the ancient land where the ancestors of the Hindus dwelt at that period. He carries away the wife of Rama, Sita; her name signifies 'a furrow,' and seems to refer to agriculture, and an agricultural race inhabiting the furrowed earth. He bears her struggling through the air. Rama and his allies pursue him. The

²⁸ Ignatius Donnelly, "Ragnarok," p. 404.

²⁹ "Bulfinch," Scott's ed., p. 375.

monkey-god, Hanuman, helps Rama; a bridge of stone, sixty miles long, is built across the deep ocean to the Island of Lanka, where the great battle is fought: 'The stones which crop out through Southern India are said to have been dropped by the monkey builders!' The army crosses on the bridge, as the forces of Muspelheim, in the Norse legends, marched over the bridge 'Bifrost.'

"The battle is a terrible one. Ravana has ten heads, and as fast as Rama cuts off one, another grows in its place. Finally, Rama, like Apollo, fires the terrible arrow of Brahma, the creator, and the monster falls dead. * * *

"The body of Ravana is consumed by fire. Sita, the furrowed earth (sky), goes through the ordeal of fire, and comes out of it purified and redeemed from all taint of the monster Ravana; and Rama, the sun, and Sita, the earth (sky), are separated for fourteen years; Sita is hid in the dark jungle (canopy), and then they are married again, and live happily together ever after.

"Here we have," says Donnelly, "the battle in the air between the sun and the demon (canopy): the earth is taken possession of by the demon; the demon is finally consumed by fire (the ruddy canopy), and perishes."³⁰

This rudy glow was one of the final features of the decline of the zonal-belt system. The ancients saw the skies being consumed and thought the world was going to be destroyed by fire, but the cataclysm turned out to be of a watery nature, as the following accounts show:

"Monan (the Maker, the Begetter), without beginning or end, author of all that is, seeing the ingratitude of men, and their contempt for him who had made them thus joyous, withdrew from them, and sent upon them *tata*, the divine fire, which burned all that was on the surface of the earth. He swept about the fire in such a way that in places he raised

³⁰ "Ragnarok," pp. 171, 172.

mountains, and in others dug valleys. Of all men one alone, Irin Magé (the one who sees), was saved, whom Monan carried into the heaven. He, seeing all things destroyed, spoke thus to Monan: 'Wilt thou also destroy the heavens and their garniture? Alas! henceforth where will be our home? Why should I live, since there is none other of my kind?' Then Moran was so filled with pity that he poured a deluging rain on the earth, which quenched the fire, and, flowing from all sides, formed the ocean, which we call parana, the great waters."³¹

Bulfinch says that Jupiter summoned the gods to council. "They obeyed the call, and took the road to the palace of heaven. The road, which any one may see in a clear night, stretches across the face of the sky, and is called the Milky Way. Along the road stand the palaces of the illustrious gods; the common people of the skies live apart, on either side. Jupiter addressed the assembly. He set forth the frightful condition of things on the earth, and closed by announcing his intention to destroy the whole of its inhabitants, and provide a new race, unlike the first, who would be more worthy of life, and much better worshipers of the gods. So saying, he took a thunderbolt, and was about to launch it at the world, and destroy it by burning; but, recollecting the danger that such a conflagration might set heaven itself on fire, he changed his plan, and resolved to drown it."³²

J. W. Foster gives the following account and abridged remarks on the Amerind legends bearing on the last great cataclysm: "Among the Indian tribes of North America, Catlin found the tradition of such a cataclysm. The tribes further south relate that the waters were seen coming in waves like mountains from the east, and of the tens of thou-

³¹ Brinton, "Myths of the New World," 3d ed., pp. 245-246.

³² "The Age of Fable," Scott's ed., p. 24.

sands who ran for the high grounds to the west, according to some traditions, one man only, and according to others, two, and still according to others, seven, succeeded in reaching places of safety, and from these have descended the present races of Indians.

“The tribes in Central America and Mexico, in Venezuela, and in British and Dutch Guiana, distinctly describe these cataclysms—one by water, one by fire, and the third by the winds. The tribes nearer the vicinity of the terrible convulsions were cognizant of the whole effects of fire and winds, when the remote tribes were sensible only of the flood of waters which went to the base of the mountains.

“From amidst ‘the thunder and flames that came out of the sea,’ whilst ‘mountains were sinking and rising,’ the terror-stricken inhabitants sought every expedient of safety. Some fled to the mountains, and some launched their rafts and canoes upon the turbulent waters, trusting that a favorable current would land them upon a hospitable shore, and thus in this elemental strife this ancient civilized people became widely dispersed.

“The festival of ‘Izcalli’ was instituted to commemorate this terrible calamity, in which ‘princes and people humbled themselves before the Divinity and besought Him not to renew the frightful convulsions.’

“It is claimed that by this catastrophe an area larger than that of the kingdom of France became engulfed, including the Lesser Antilles, the extensive banks at their eastern base, which at that date were vast and fertile plains; the peninsulas of Yucatan and Guatamala, went down the splendid cities of Palenque and Uxmal, and others whose sites are now in the ocean bed, with most of their living inhabitants; and the Continent has since risen sufficiently to restore many of these ancient sites. * * *

“The authority of Charles Martins is appealed to, show-

ing that 'hydrography, geology, and botany agree in teaching that the Azores, the Canaries, and Madeira, are the remains of a great continent which formerly united Europe to North America.' ³³

Plato's description of Atlantis, as received by Solon from the Egyptian priests, bears repetition again, it was as follows:

"There was an island situated in front of the straits which you call the columns of Hercules; the island was larger than Lybia and Asia put together, and was the way to other islands, and from the islands you might pass through the whole of the opposite continent, which surrounds the true ocean."

The rupture of the Midgard serpent caused the agitation in the mind of primitive man which gave rise to the wildly exaggerated reports and stories of the above catastrophe. It must be remembered that, after all, our forefathers saw only the remnants of the mighty annular system which had been the time-maker of the geological ages. The periods of cold and the great flood of Deucalion were only echoes of the last stages of the Ice age, or, more properly, "ages."

The Midgard serpent girded the whole earth, and it is recorded that his tail, finding no other place, grew down his throat. This is the language of the Younger Edda:

The eagle screams,
And with pale beak tears corpses.
Mountains dash together,
Heroes go the way of Hel,
And heaven is rent in twain.
All men abandon their homesteads
When the warder of Midgard
In wrath slays the serpent.

³³ "The Prehistoric Races of the United States of America," 6th ed., pp. 396-398. Catlin, "The Lifted and Subsided Rocks of America," London, Trübner & Co., 1870. *Revue des Deux Mondes*, March, 1867.

The sea grows dark,
The earth sinks into the sea,
The bright stars
From heaven vanish;
Fire rages,
Heat blazes,
And high flames play
'Gainst heaven itself.

The Mexican account says:

"Quetzalcoatl, the Toltec deity, learning that his father had been slain by the cloud-snakes, rose upon them and rushed into their temple with his tigers. He slew many, the guiltiest of them he hewed and hacked, and, throwing red pepper on their wounds, left them to die. This is the explanation they give of the ruddy and crimson hue of the clouds in the eastern sky. * * * "And his funeral pile is on top of Orizaba, where, overcome at length by his enemies, he lay down to die. Wrapped in the flames, his body rose up to heaven. We have the like in the Greek mythology in the tale of Herakles." ³⁴

The skies were strangely peopled in those days
With gods, and goddesses, and giants strong,
With heroes, witches, demigods, and dwarfs.
Yea, many mortals also dwelt on high,
For after death Valkyries brave were sent
To bring the warrior chieftains to Valhalla,
Where Odin kept an open door for them.

From thence deep music seemed to issue forth—
The sound of all its tumult Wagner heard:
The clear horn-call of many waters rang.
A mighty hero known as Siegfried fell,
And Brunehild seized a torch and lit his pyre.
Then, as the flames rose high, she jumped upon
Her horse's back and raised him for the leap.
O Siegfried! Siegfried!" rang her cry. She sprang
Into the rising, eating flames, which flew
And, gaining volume, mounted higher, higher,

³⁴ Charles De B. Mills, "The Tree of Mythology," pp. 29-30.

Unto the very heavens, to the clouds,
That flaming canopy, all ruddy red,
The fiery wall between the earth and sky.
'T was then the bright ring fell back to the earth.
The Maidens of the Rhine swam to the shore
And caught the circlet as it reached its home.

The faggots of the world-ash now caught fire
Through the green trellis shot the crimson rays,
And all the world was bathed in bloody glow.
Then wildly, still more wildly, leaped the flames.
Valhalla was surrounded with red fire;
It could no longer from the earth be seen—
The fearful glow and smoke filled all the air.

Lo! the last twilight of the gods had come—
The faggots of the world-ash flared and blazed,
And all the gods came rushing to the war.
The earth itself was frightened and did shake.
The sea above flowed from its basin strong,
And the firm heavens were thus torn asunder
And many men did perish from the earth.
The eagles of the air fed on themselves,
Their quivering bodies being yet alive.
The great wolf Fenris broke his bands and rushed.
The Midgard serpent rose out of the sea,
And Loke burst his bonds and joined the giants.
Then all rushed to the war against the gods.

“In the midst of this clash and din the heavens are rent in twain, and the sons of Muspelheim come riding through the opening.” Muspelheim, according to Anderson, means ‘the day of judgment.’ So that this passage means that the heavens are split open, and the canopy falls, or appears to fall, to earth. Surt rides first, and before him and after him flames burning with the appearance as it were of fire lighten the canopy. Surt is the personification of this fire feature of canopy decline. He is the same as the destructive god of the Egyptian mythology, Set, or Seb, who destroys the sun.

The gods came forth across the Bifrost bridge.
Their horses' hoofs made clashing din and noise
As they rushed o'er the bridge,—then trembling.

And as they rushed a fearful crash rang out.
The Bifrost bridge fell under them, a wreck.
But on they rode, regarding not its fall,
To meet their enemies in force arrayed,
The followers of Hela and the giants.
And all this time the faggots blazed away—
O fearful was the bonfire that they made!

This mighty ash-tree was supposed to hold
The world-wide universe upon its limbs.
So now in terror all the earth beheld
And saw it burning—O the fearful sight!

The gods advanced, great Odin led them on.
Alone he rushed against the Fenris wolf,
And, rushing, fell a victim in his jaws.
(The canopy in falling did this thing.)
Then afterwards by Odin's son he fell.
For Vidar, who could walk upon the air,
Survived the falling vapor thing, of course.
Then Thor engaged the Midgard serpent vile,
And great renown was his for killing him;
Yet by its death, he killed himself also—
The venom of the monster caused his death.³⁵

The Frost giants fought, and Loke met his fate
By Heimdall, the bright rainbow of the sky.³⁶

And Heimdall lived, and yet he died because
The rainbow dies when all the war is o'er.
O fearful was the fighting everywhere!
'T was Surtur, the fire-giant, threw a dart
Which killed poor Frey. Some say that he did start
The fire which burned the universal tree.

The world-ash has returned unto its source—
The doomsday of the gods like smoke is gone,
And dissolution of the well known facts
Has followed in the thoughts of modern man.
Mythology, however, still retains
The bone and substance of the facts entire,

³⁵ The Age of Ice put an end to thunder storms.

³⁶ Heimdall was originally the keeper of the bridge Bifrost. In the new order of things, he became associated with the rainbow, the only vapor bridge left in the sky.

As has been shown by raking up the dust
Which fiction has deposited so thick.
But all this web can never hide the truth
If one will 'pick' it from its mother lode.

The end had come:

"Finally Tyr spoke: 'And is there no hope, Odin? Does all end in darkness?' At these words Odin's face changed; a gleam of sunshine seemed to fall upon it, and he said: 'I see arise, a second time, earth from ocean, beautifully green. I see waterfalls where leap the fish, and eagles flying over the hills. I see Baldur and Hödur, the rulers of a purer race of mortals,—mortals who have long served Baldur in the lower world,—and near them Vidar and the sons of Thor. They meet on Ida's plains, and call to memory the mighty deeds of the old gods, and their ancient lore. They speak of the serpent, the great earth-encircler, and of the deeds of Loke and of Thor. Unsown shall the fields bring forth, and all evil shall be done away with when Baldur and Hödur reign.'

"He ceased, while his gaze seemed penetrating through the misty ages."³⁷

³⁷ Litchfield, "The Nine Worlds," p. 155.

INDEX OF AUTHORS

284 authors

- Abbot, C. C., 128, 132
 Adhemar, 93, 99
 Afanasyeff, 279-280, 332-357
 Agassiz, L., 3, 60-61, 83, 100
 Amos, 173
 Ampelius, Lucius, 202
 Anderson, Rasmus B., 361, 363, 370, 384
 Andree, 165
 Andrews, Dr. E., 128, 130
 Angot, Alfred, 28
 Angström, 16
 Argyll, Duke of, 48-49
 Aristotle, 201, 236, 256, 302
 Arrhenius, 15
- Balboa, Vasco Nuñez de, 266
 Ball, Sir Robert, 101, 115, 116
 Bancroft, George, 170, 190-191, 258, 267-270, 315-316, 318
 Barker, George F., 21
 Barrande, 52
 Barrois, M. Chas., 61
 Basil, St., 156
 Bean, Dr. Tarleton H., 54, 94
 Beche, Sir. H. de la, 55
 Bell, Dr. Robert, 131
 Bergaigne, 175
 Berosus, 167, 257
 Bertrand, J. L. F., 61
 Berzelius, Baron J. J., 14
 Blake, John F., 209
 Blank, Rev. J., 143, 274-275
 Bleek, W. H. J., 310
 Bonney, T. G., 116
 Bourbourg, Brasseur de, 222-223
 Boyesen, H. H., 370
 Bradbury, Robert H., 65
 Brinton, Daniel G., 135, 162-163, 245, 265, 308, 309-310, 315, 317, 318-319, 328, 364, 379-380
 Brugsch, Dr. H. de, 162, 248
 Bryant, William Cullen, 233-234
 Buckland, Dr. William, 55
 Budge, E. A. Wallis, 220
 Bühler, 189
 Bulfinch, Thomas, 225, 242, 287, 378, 380
 Byron, Lord, 262-263
- Cæsar, St., 156
- Carlyle, Thomas, 358-359, 367-368
 Carter, R. Kelso, 6, 69
 Cary, Henry, 143-144, 255
 Catlin, George, 380, 382
 Cayeux, L., 61
 Chamberlin, T. C., 7, 13-14, 15, 18-19, 35, 77, 85, 98, 99, 105-106, 108, 112, 118-119, 120, 125
 Champollion, Jean Francois, 226
 Chandler, Dr., 35
 Cicero, 156, 256
 Clerke, Agnes M., 23, 29, 33, 35-36, 38, 39, 41, 72, 232
 Coan, 123
 Collet, John, 126-127
 Cooper, 257
 Cortez, 148
 Creech, 57
 Croll, James, 93, 99, 101, 116, 124
 Curtin, Jeremiah, 280-285, 320-328, 332-335, 337-338, 340, 343-348, 372
 Cuvier, 59
- Dana, James D., 6, 24, 59, 66-67, 71, 75-76, 77-78, 99, 101, 109, 110, 112, 122
 Daniel, 173
 Dante, 304
 D'Anvers, N. (Nancy Bell), 139
 Darwin, Charles R., 53, 61, 100, 103, 124
 Darwin, Erasmus, 147
 Darwin, Prof. G. H., 41
 Dastre, A., 60-62
 Dawson, Sir J. W., 47-48, 90-91, 157
 Delitzsch, 210
 Dellenbaugh, Frederick S., 117-118, 133, 134-137, 150
 De Vries, 60, 63, 71, 89, 125
 Diaz, Bernal, 148
 Dickeson, Dr., 244
 Dobbins, Frank S., 251, 311, 360
 Donnelly, Ignatius, 4-5, 46, 148-149, 151, 239-240, 258, 264, 266, 267, 268, 289-290, 311-315, 317, 318, 378-379
 Dove, Heinrich Wilhelm, 26
 Duram, 239-240
- Edwards, Amelia B., 139, 241, 247-248, 251
 Elton, 272-273

- Emerson, B. K., 130-131
 Epictetus, 223, 308
 Euclid, 256
 Ezekiel, 169, 171, 173, 199
- Fairchild, Herman Le Roy, 7-8, 21, 44-45
 Farrington, Dr. Oliver C., 33
 Fisher, 120
 Fiske, A. K., 148
 Flammarion, M., 209
 Floegel, 28
 Foerste, A. F., 78-79
 Fontenelle, 158-159
 Foster, J. W., 137-138, 243-244, 245, 380-382
 Frere, J. H., 143
- Gardner, J. Starkie, 5, 96
 Geikie, Archibald, 17-18, 24-25, 84-87, 89-90, 116, 120, 122-123
 Geikie, James, 42-43, 87-88, 93-94, 101, 109, 114-115, 138, 141
 Gilbert, G. K., 129, 131
 Gratacap, L. R., 62-63
 Gray, Asa, 84, 95, 97, 104
 Grey, Sir George, 178-181
 Groneman, 32
 Gubernatis, A. de, 341
 Gudea, 203, 246
- Habakkuk, 158, 173
 Haggai, 173
 Hann, 16
 Hansew, 126
 Harrison, Frederick, 155
 Hartung, 259
 Hayne, 46
 Heer, Oswald, 5, 76, 90, 96, 97
 Heilprin, Angelo, 52, 53, 140
 Heraclitus, 237
 Herodotus, 144, 203, 255, 302
 Hesiod, 143-144, 231, 255, 256, 274, 275, 288, 307, 326
 Hilprecht, Herman V., 45-46, 145, 196, 209, 245
 Homer, 201, 224, 231, 233-234, 254, 255, 280, 306, 307
 Hooker, Sir J., 97, 115
 Hopkins, Edward Washburn, 174-175, 176, 177, 186-187, 193-194, 255
 Howe, Herbert A., 36
 Humphrey, 132
 Huygens, Christian, 33
 Hyginus, 202, 229
- Ideler, 236
 Isaiah, 151, 156, 158, 172, 173, 198, 200, 357
- James, St., 159, 236
 James, George Wharton, 328-331
 Jamieson, T. F., 94, 120
 Jastrow, Morris, Jr., 164, 196, 197-198, 203, 205, 209, 210, 211, 212, 214, 215-218, 264
 Jensen, 246
 Jeremiah, 156, 158, 172, 173
 Job, 20, 145-146, 151, 153, 157, 159, 163, 172, 173, 198, 208, 225, 242, 263, 372
 Joel, 173
 John, St., 159, 172, 173, 377
 Johns, C. H. W., 205
 Josephus, 201
 Joshua, 158, 173, 235
- Kant, Emanuel, 4, 6, 38
 Keeler, James E., 36, 37, 232
 Kemp, James Furman, 17
 Kepler, Johann, 30
 King, L. W., 200-202, 205, 206, 207
 Kotzebue, Otto von, 54
 Kuhn, Adalbert, 259
 Kuntze, 97
- Lakes, Arthur, 76-79
 Lamarck, 63, 65
 Lang, Andrew, 168
 Langley, S. P., 21, 72
 Lanoye, F. De., 132, 162, 226, 250
 Lapham, 149
 Laplace, 38
 Lartet, 77
 Le Conte, Joseph, 17, 20-21, 43, 60, 68, 81, 102, 122, 129
 Lemstrom, Prof., 91-92
 Lenormant, 5, 364
 Lesser, Isaac, 208
 Lewis, Carville H., 125
 Litchfield, 373, 386
 Lockyer, J. Norman, 248
 Logan, Sir William, 131
 Lucas, Frederick A., 62
 Lyell, Sir Charles, 21-22, 46, 48, 54-55, 60, 101, 104-105, 124
- Mackintosh, D., 131
 Macrobius, 308
 Manilius, 202
 Manson, Marsden, 7, 51, 97
 Martins, Charles, 381
 Maspero, G., 227, 241, 247-248, 251
 Massey, 238
 Matthew, Dr. W. D., 99
 Maurice, 147, 194-195
 Metz, 128
 Meunier, M. Stanislas, 25-26
 Miller, Hugh, 56-58

- Mills, Charles De B., 151, 178-181, 185-186, 213, 234-235, 252-253, 257, 281, 283, 286, 316, 318, 383
- Milton, 153
- Moore, Thomas, 212
- Moses, 172, 216
- Müller, Max, 168-169, 182, 183, 186, 230-231, 255, 259, 371
- Murray, Alexander S., 185, 259, 287
- Nadaillac, Marquis De, 139, 371
- Newton, Sir Isaac, 224, 237
- Nolan, James, 41
- Nordenskjöld, 5, 28, 54, 96
- Origen, 156
- Orton, James, 97
- Ovid, 228-229, 235, 242, 265, 272-273, 276
- Paley, F. A., 256
- Pearson, H. W., 92-93, 117
- Penck, 117
- Penka, 371
- Peter, St., 156, 165, 173
- Phené, John S., 148
- Pherekydes, 280-281, 364
- Pierret, 248
- Pindar, 242, 254
- Plato, 219, 229, 297-307, 377, 382
- Plutarch, 302
- Poor, L. E., 147, 153, 250, 264, 291-296, 335, 369
- Powell, Major J. W., 118
- Powers, 270
- Pozzi, G., 119
- Preller, 302
- Prescott, William H., 191, 192-193, 242-243
- Prestwich, Joseph, 46, 47, 125, 141, 165-166
- Price, Ira Maurice, 365
- Proclus, 237
- Procter, Bryan Waller, 278
- Ptolemæus, Claudius, 169, 256
- Purchase, 357
- Pythias, 258
- Ragozin, Zénaïde A., 175-176, 177, 185, 200, 203, 213, 364-365
- Raleigh, Sir Walter, 378
- Ralston, W. R. S., 279-280, 341-342, 348-356
- Ramsay, Sir Andrew, 80
- Rassam, 144
- Rawlinson, George, 159, 167, 220-222, 225-226
- Rice, William North, 81
- Richardson, 315
- Richtofen, 18
- Rogers, 80
- Roscoe, H. E., 14-15
- Ruskin, John, 257, 262
- Russell, Israel C., 112, 131
- Rutherford, E., 52
- Sachs, 65
- Salisbury, Rollin D., 15, 18-19, 35, 77, 85, 98, 99, 105-106, 108, 110-111, 112, 118-119, 120, 121-122, 132
- Sanchoniathon, 257
- Saporta, Marquis de, 99, 371
- Sardeson, P. W., 51
- Saussaye, De La, 372
- Sayce, A. H., 140, 198, 199-200, 211, 259
- Schardt, 85
- Schloesing, 14
- Schorlemmer, C., 14-15
- Schröder, 255
- Schuchert, Charles, 99
- Schwartz, Ernest H. L., 79-80
- Scipio, 308
- Scott, Rev. J. L., 225, 242, 287, 378, 380
- Scribner, G. Hilton, 5, 97
- Scrope, 122
- Seeley, H. G., 70
- Seneca, 256
- Shakespeare, 143
- Shaler, N. S., 78-79, 106, 120
- Smith, Angus, 15
- Smyth, Piazza, 241
- Socrates, 301
- Solon, 219, 229, 382
- Spencer, Herbert, 65
- Standfuss, Dr. Max, 74
- Stedman, Edmund Clarence, 254
- Stewart, J. A., 297-307
- Stokes, Frank Wilbert, 27, 29
- Suess, E., 60
- Taylor, Canon, 295
- Tennyson, Alfred, 174
- Theognis, 143
- Theopompos, 302
- Tiele, 259, 310
- Tomlinson, A. B., 244
- Tylor, 222-223, 264, 280, 315
- Tyndall, John, 12-13, 19, 26-27, 72, 102
- Upham, Warren, 127-128, 129, 130-132, 133
- Vail, Prof. Isaac N., 6, 7
- Very, 16

Vezian, A, 85
Virgil, 57

Wagner, 383

Wallace, 96, 97

Waltershausen, Sartorius von, 123

Warren, William F., 5, 96, 97, 188, 201-
202, 229-230, 236-237, 310

White, Dr. Charles A., 62

White, I. C., 126, 127

Winchell, Alexander, 80-81, 82, 111-112,
141-142

Winchell, N. H., 129, 130

Woodworth, J. B., 78-79, 129

Wright, G. Frederick, 6, 44, 48, 81-82, 84,
94-96, 100, 101, 106-107, 109, 112, 114,
119-120, 126-127, 128-129, 130, 137,
138, 141, 166-167

Zechariah, 173

284 authors -

INDEX OF SUBJECTS

- Abou Mohammed, 151
 Absorption, atmospheric, 21-22, 53, 63,
 72, 98
 Achilles, 234, 282, 292, 293
 Actinic rays, 72, 161-162
 Aevins, 146, 177, 187, 198
 Adad 196
 Adamite Race, 5, 137, 161, 166
 Admeta, 288, 289
 Adonis, 153, 221, 317, 370
 Adrastea, 259
 Adumbla, 368
 Æsir, 359, 361, 363
 African myths, 165, 310, 316
 Afrites, 151
 Age of darkness, 151, 154, 178-181, 183,
 190, 191, 257, 313
 Agni, Agny, 174, 175, 176, 249, 250, 255,
 256
 Ahi, 185
 Ahriman, 141, 328, 369
 Ahura-Mazda, 141
 Akhu, 238
 Alcmena, 277
 Algonkin age, 80
 Algonkin myths, 234-235, 267, 280, 309,
 316, 318, 319, 327
 Alpheu, 260
 Alternating seasons, 50-51, 97-98, 103
 Amalthea, 259
 Amazons, 288
 Amenti, 226
 Amerinds, 134-136
 Amerind myths, 149, 150, 151, 154, 162-
 163, 168, 170, 174, 190 ff., 196, 222-223,
 227-228, 231, 234-235, 240, 243 ff.,
 249, 258, 264 ff., 281 ff., 308-331, 364,
 372, 376, 378, 379-382, 383
 Ammon-Ra, 220-221
 Anamorphic zone, sympathetic earth
 movements, 42, 75, 122-123
 Ananta, 150, 189
 Anastasia the Fair, 350
 Ancient astronomical knowledge, see As-
 tronomical knowledge.
 Annihilation of the gods, 223, 308
 Annular systems, 30 ff., 38, 40, 42, 69
 Annular theory, 6
 Antigone, 233
 Anu, 200, 206, 207, 210, 211, 212, 216,
 246, 255
 Anubis, 225
 Anunnaki, 217
 Apapi, 248, 251
 Ap-en-to, 238
 Aphrodite, 249
 Apocatequil, 317
 Apollo, 231, 254, 255, 261, 262, 265, 271,
 272, 276, 375, 378, 379
 Apophis, 148, 225, 226, 227
 Apples, see Golden and Star-eyes, 146,
 242, 289-291, 348
 Apsu, 200, 201, 204, 211
 Arabian tales, 151, 172, 264
 Archæology, 12, 19, 45-46, 132-142, 148,
 155, 371
 Archæozoic, 45
 Archean, 80
 Argo, 280, 291
 Argonauts, 291
 Ariadne, 273
 Ariconte, 153
 Arid regions, 98, 140
 Arion, 378
 Arthur, 283, 294 ff.
 Artemis, see Diana, 271
 Aryan myths, 141, 144, 168, 169, 174,
 185-186, 219, 371
 Asa-bridge, 367
 Asaheim, see Asgard, 363
 Asgard, 264, 359, 361, 366, 374
 Ashur, 219
 Assyrian myths, 171, 196-218, 231, 242-
 243, 317
 Astral æon, 6
 Astronomical hypothesis, 101 ff.
 Astronomical knowledge, ancient, 143-
 144, 147, 170, 182, 208-210, 223, 241,
 256 ff., 272
 Asura, 175, 176, 187, 250
 Asva, 186, 230
 Ataguja, 317
 Aten, 220, 221
 Athene, 261, 262, 271, 274, 275
 Atlantis, 237, 263, 302, 382
 Atlas, 146, 147, 237, 260, 290
 Atmospheric blanket, 7, 11, 12, 20 ff., 51,
 70-71, 98

- Atmospheric hypothesis, 101 ff.
 Atua, 238
 Augeus, 288
 Aurora, the goddess, 260
 Aurora Polaris, 22, 27 ff., 32, 91-92
 Australian myths, 165, 310, 326
 Avatar, 189, 193, 194-195, 196, 211, 247, 287
 Axial-rotation, 35-38, 39
 Azoic, 61
 Aztecs, 150, 151, 191 ff., 267, 280, 308, 309, 314, 319, 376

 Baal, 169, 369
 Baal-peor, 169
 Baba Yaga, 351 ff.
 Babel, 167-169, 173, 176, 239 ff.
 Babylonian myths, 164, 167, 182-183, 185-186, 193, 196-218, 239, 242-243, 245 ff., 257, 277, 284, 285, 289-290, 365, 366, 368, 369, 376
 Bacchus, 357
 Bal, 185
 Balder, 234, 292, 359, 368, 369, 370, 386
 Barbarossa, Frederick, 294
 Basutos, 316
 Bau, 203
 Behemoth, 152
 Bel, 169, 197, 198, 202, 204, 205, 206, 207, 209, 210, 211, 216, 217, 257, 278
 Bel-Dagon, 277
 Bel's sanctuary, 45-46
 Belit, 197
 Bellerophon, 274-275
 Beowulf, 153, 185, 281, 283
 Bes, 227
 Biela's comet, 23
 Bifrost-bridge, 264, 359-360, 361, 366, 369, 379, 384, 385
 Big-headed animals, 67 ff.
 Biological crisis, see Suddenness, 63
 Bird (sun), see Winged sun, 174
 Birth of the Myths, 4 ff., 12, 19, 358-359
 Boar, 152, 194-195, 287 ff., 336, 342, 361, 378
 Boat, see Halo-boat and egg, 222, 224-225, 226, 249-250, 251 ff., 273
 Book of the Dead, 223 ff., 237-238, 247
 Brage, 290
 Brahma, 141, 187-188, 194, 276, 368, 379
 Briareus, 152
 Bronze age, 47, 138
 Brooks's comet, 35
 Brunehild, 383
 Bull, see Cows, 170, 210, 212, 273, 288, 355, 368
 Buoyant atmosphere, see Density, 69-70

 Buried organic matter, 126-127
 Burning canopy, see Conflagration, Ollebis, and Ragnarok, 280 ff.
 Bushmen, 310
 Butterfly experiments, 73-74
 Buyan, see Egg-land, 341

 Cacus, 234, 270
 Cadmus, 153
 Caf, Mount, 196
 Calypso, 170, 316
 Camaxtli, 150
 Cambrian, 52, 61, 77, 80, 98, 119
 Canaanite myths, 227
 Canopus, 143
 Capitoline, 153
 Carbonaceous meteorites, 34
 Carbon-dioxide blanket, 12, 15 ff., 21, 34
 Carbon dioxide in atmosphere, 13-14, 72, 74, 98, 102, 113, 267
 Carbon dioxide, limitations for life, 14-15, 74
 Carboniferous age, 14, 44, 45, 52, 62, 69, 71, 75, 76, 77, 78, 79, 80, 81, 84, 116, 117
 Catastrophic changes, 46, 48, 50, 53, 54, 56, 59 ff., 111, 166, 299, 379 ff.
 Caucasian race, 5, 137, 166
 Cave, see Egg-land
 Celestial bridge, 361
 Celestial vault, 230
 Celtic legends, 377
 Cenozoic, 59, 98
 Centaurs, 287
 Centrifugal force, 16, 23, 29, 34, 103, 214, 232, 324
 Cerberus, 275, 285, 290
 Cesha, 188-189
 Chaldean, see Babylonian
 Champlain period, 77
 Chaos, 154, 204, 250, 257, 258
 Chapewee, Chakabech, 312-313
 Chariots, 158, 182, 186, 204, 211, 219, 228-232, 304 ff.
 Charon, 264
 Cheops, 158, 241 ff.
 Cherubim, see Good cherub, 170-171, 173
 Chimæra, 152, 274, 275, 285
 Chinese myths, 165, 182, 209, 268, 370
 Choctaw, 168, 264, 265
 Chudo, 351, 356
 Clam-shell canopy, 258, 313
 Climate, solar, 50-51, 97-98, 103
 Climate, vagaries, 5, 13, 49, 53, 63, 75 ff., 89 ff., 103, 109-110, 119
 Cloud-mountain, see Mountain, 151, 196, 210, 213, 223, 236, 245, 260, 264, 289, 302

- Cloud-snakes' mountain, 150, 383
 Complex organisms, 66
 Concentric zones, 246 ff., 256 ff.
 Conflagration of heaven, see Ollebis and Ragnarok, 219, 230, 319-325, 326, 351, 365, 367, 370, 375, 379 ff.
 Confusion of tongues, 167-169, 249, 313
 Conglomerates, 44, 45, 78, 79, 80, 85, 86, 116
 Connecticut River flood, 109
 Controversy, astronomers and physicists with geologists, 42
 Controversy of geologists and mathematicians, 11
 Copper bridge, 343
 Copper ring, 339
 Cosmos, 299-300
 Cows, cattle, see Bull, 152, 162, 176, 177, 184, 185, 211, 217, 222, 249, 261, 270
 Coxcox, 192 ff.
 Coyoteros, 315
 Crab, 286
 Creation epic, Babylonian, 204 ff.
 Cremation, 370-371
 Cretaceous, 53, 59, 67, 71, 76, 85, 91, 99, 125
 Critias, 302
 Cronus, 167, 250, 258 ff., 299 ff.
 Crow, see Ka, 261
 Curetes, 259
 Cybele, 260, 278
 Cyclonic areas, 14, 20, 102, 105, 107-108, 112-114
 Cyclops, 289
- Dadhikrāvan, 186, 230
 Dædalus, 272
 Dæmons, 286, 291, 305 ff., 369, 378-379
 Dahish, 153
 Danaë, 255, 277, 286
 Danish myths, 293-294
 Daphne, 255, 375
 Darkling, 154, 317
 Dark world, 151, 154, 178-181, 183, 190-191, 225, 257-258, 268, 310, 315, 373, 375
 Date, withdrawal of ice, 125 ff.
 Day, Biblical, 156, 157 ff.
 Day, Joshua's, 158, 173, 235
 Deathless One, see Koshchéi
 Declination of the heavens, 219, 230, 359
 Deer, 152, 154
 Delos, Isle of, 263, 265, 271
 Delphic oracle, 231-232, 259, 272
 Deltas, 132
 Deluge, see Noachian and Deucalion
 Deluge of Ogyges, 287, 377
- Density of atmosphere, 53, 63, 65-69
 Descent of man, 136-137
 Desiccation, 98, 118-119, 159
 Deucalion deluge, 165, 219, 230, 287, 377, 378, 382
 Deva Sūrya, 141, 186
 Development of the races, 136-137
 Devonian, 50, 52, 61, 63, 71, 80, 85
 Dew, 159, 173
 Diana, 271, 276, 287
 Dibbarra, 217
 Dicktain cave, 265
 Dimiriat, 153
 Dinosaurs, 67 ff., 71, 73
 Diomedes, 288
 Disagreement amongst physicists, 16
 Disintegration, 126-127
 Disk-worship, 219 ff.
 Distribution of species, see Migration, 52 ff., 89 ff., 140
 Doctrine of isostasy, see Weight of ice
 Doctrine of uniformity, 46, 54, 60, 66, 105, 124
 Dog of hell, 152, 275
 Dog Rib Indians, 312
 Dokos, 321
 Dome of Heaven, 200-202
 Doomsday, see Ragnarok, 264, 267, 385
 Dragon, 146, 151-152, 153, 175, 185, 204, 205, 213, 234, 237, 274, 275, 285, 290, 328, 336, 339, 342, 355, 369, 370, 378
 Dragon-fly, 356
 Dragons of the air, 70-71
 Draupner, 373
 Druids, 277, 294
 Drunkenness, Noah's, 161-162
 "Dumb flutter," 315
 Dust-clouds, 17 ff., 24 ff.
 Dust, ferruginous, 29, 32, 33
 Dust, inter-planetary, 34-35, 45, 50
 Dust, meteoric, 32, 47
 Dust, planetesimal, 32, 47, 71, 360
 Du-Zu, 317
 Dwarfs, 372, 383
 Dyaus, see Zeus, 144, 175, 177, 184, 254-255, 371
- Ea, 196, 200, 203, 206, 207, 210, 211, 214, 215, 247, 261, 276, 278, 284, 326, 369
 Eagle, 171, 290, 350, 374, 382, 384
 Early record of solar and stellar phenomena, 143-144, 147, 170, 183, 208-210, 223, 241, 256 ff., 272
 Echidna, 232, 274, 275, 285
 Echo, 144, 169, 195, 208, 222, 307
 Eden-like conditions, see Greenhouse, 142, 147, 160, 161, 162, 170, 171, 172, 201, 366, 377

- Egg, see Halo-boat, 149, 174, 202, 248-249, 310, 317, 340 ff.
- Egg-land, 169, 170, 241 ff., 250, 263 ff., 272, 289, 297, 315, 322, 339, 363, 366, 376
- Egyptian myths, 143, 144, 145, 148, 149, 162, 165, 176, 182, 185, 187, 196, 203, 213, 219-253, 255, 256, 260, 263, 265, 273, 276, 277, 308, 310, 314, 318, 357, 366, 369, 375, 377, 378, 382
- El, 250
- Electric expulsion, 23
- Electric stimulus, 91-92
- Electryon, 277
- Elivagar, 369
- Elliptical systems, 29, 38
- Elysian Plain, 242
- Enceladus, 152
- Environment, see Mutation, 63, 65 ff., 73-74, 136
- Eocene, 85, 89, 92, 93
- Eocene continent, 5, 92, 96
- Eos, 260
- Epeirogenic theory, 101
- Epic of Gilgamesh, 211 ff.
- Epigene agencies, 45
- Er, Myth of, 298 ff.
- Erebus, 257
- Eros, 253, 307
- Erymanthus, 361
- Eskers, 130
- Eskimo, 133, 168, 312
- Etana, Legend of, 201
- Eurystheus, 278, 280 ff., 287 ff., 337
- Evolution, see Mutation, 52, 60, 61 ff., 63, 89 ff., 124
- Evolution of man, 136-137
- Exogens, 50-51, 98
- Explosions of life, see Suddenness, 61, 62
- Extinction of species, 48, 52, 54-58, 71
- Fafnir, 185
- Falcon, 350, 354-355
- Falls of St. Anthony, 129 ff.
- Fates, 296
- Fedor, 350
- Fenris-wolf, 152, 313, 371, 372, 373, 375, 384, 385
- Fimbul-winter, 373
- Finn cosmology, 256, 280, 281
- Fire ring, 152, 174, 175, 185, 201, 255, 256, 297, 298, 303, 363
- Fire worship, 174, 176
- Firmament of water, 4, 7, 16, 19, 23-24, 30, 37, 97-98, 111, 143, 145, 146, 156, 157, 158, 173, 177, 200, 205, 206, 249, 321
- Flaming sword, 163, 170, 173, 282 ff., 295-297, 336, 345, 377
- Floating Bridge, 360
- Floating Region, 360
- Flood, see Noachian, Deucalion, and Deluge of Ogyges, 192 ff., 230
- Fortunate Fields, 242
- Four ages, 190 ff., 309
- Four rivers, 188, 201, 299, 309, 367
- Freshness of glaciated surfaces, 125
- Frey, 361, 371, 373, 378, 385
- Frigy, 365
- Frog monster, 149, 150, 152
- Furies, 296
- Gaea, 259
- Gallineros, 269
- Ganesha, 251
- Gaps in the biological record, 53, 59-60, 62-63, 66, 67, 70-71
- Garden of Hesperides, 146
- Geological ages, 11, 35, 39, 41, 49 ff., 52, 67, 108, 382
- German legends, 250, 294, 314
- Geryon, 234, 242, 270, 274, 289
- Giants, see Titans, 260 ff., 265, 290, 293, 307, 341, 348, 362, 367, 368, 369, 370, 372, 373, 374, 378, 383, 384, 385
- Gigantic life, 67-71
- Gilgamesh, 164, 211 ff., 215 ff., 289
- Gimle, 363
- Gisl, 361
- Gjallar bridge, 369
- Glacial centres, see Cyclonic areas, 108, 165
- Glaciation in remote ages, 78 ff., 98-100, 117, 120
- Glad, 361
- Gladshiem, 375
- Glaive of light, 283
- Glener, 369
- Gler, 361
- Gods annihilated, 223, 308
- Golden age, 151, 189, 192, 259, 299 ff., 307, 321, 322, 359, 365, 366
- Golden apples, 289, 339, 365, 374, 375, 378
- Golden bridge, 336, 343
- Golden car, 187
- Golden fleece, 291
- Golden germ, 174
- Golden ring, 339
- Goldtop, 361
- Gondwana Land, 99
- Good cherub, 171, 173, 199, 227, 243, 369
- Goose, brooding, 310
- Gorgian Myth, 304
- Gorgons, 285, 351

- Gowila, 327
 Gram, dog, 152
 Gravity, 11, 18 ff., 23, 30, 40, 41 ff., 43, 49, 63, 69, 75, 92, 93 ff., 106, 224, 232, 237
 Grecian myths, 144, 146, 163-164, 165, 168, 170, 186, 196, 201, 204, 205, 208, 211, 213, 219, 221, 224, 228 ff., 236, 242, 254-275, 276-296, 297-307, 318, 322, 342, 357, 359, 363-364, 366, 369, 374, 383
 Green Daughter, 335 ff., 346 ff.
 Greenhouse-roof, see Golden age and Eden-like conditions, 6, 12, 20 ff., 91, 97, 159, 192, 199, 211, 224-225, 233, 259, 359
 Grendel, 153, 185, 283
 Grizzlies, 282 ff., 326
 Guachemines, 154, 317
 Gukumat, 150
 Gyller, 361
 Gypsum beds, 98, 118

 Hades, 224, 237-238, 291
 Hagene, 234
 Halcyon days, 192, 377
 Hall of Two Truths, 222, 223, 226, 239, 247
 Halo-boats, see Egg, 145, 146, 147, 149, 151, 170, 175, 176, 182, 203, 207, 249 ff., 252 ff., 263, 273, 278, 288, 289, 314, 336, 355, 361
 Hanuman, 379
 Hare, 152, 227-228, 231, 234, 273, 280, 312, 318, 319, 342
 Harmonia, 364
 Hathor, 249
 Hau, 321
 Haugebasse, 341-342
 Havasupais, 328, 330
 Heat a requisite to an ice age, 15, 102, 112-115
 Heavier-than-air canopy, 16, 22, 34
 Hebrews, see Firmament, 145, 155-173, 201, 204, 213, 225, 317, 357, 365, 369
 Hector, 233
 Heimdall, 361, 385
 Hel, 369, 371, 382, 385
 Helios, 219, 260, 288
 Heliotropism, 51
 Hell, 152, 264
 Hera, 255, 261, 271
 Hercules, 146, 147, 153, 163-164, 170, 177, 178, 185, 211, 213, 270, 275, 276-296, 327, 361, 369, 375, 378, 382, 383
 Hermes, 282
 Hermione, 153
 Hermond, 369

 Hero of the Plain, 343 ff.
 Hesperides, 144, 242, 285, 289, 290
 Hestia, 305
 Hidery Indians, 310
 Hindu myths, 146, 147, 150, 152, 165, 174-195, 198, 231, 248-249, 254-255, 257, 258, 261, 263, 264, 276, 286, 287, 313, 356, 368, 369, 375-376, 378-379
 Hippolyta, 288
 Höder, 233, 369, 386
 Hokomata, 328 ff.
 Holger Danske, 294
 Horses, steeds, 173, 176, 177, 182, 186, 187, 204, 211, 219, 228-232, 252, 273 ff., 291 ff., 304 ff., 336, 339, 342, 343 ff., 352, 354, 361, 374, 384
 Horsemen, 177
 Horns, 220, 221, 225, 226
 Hydra, 178-182, 185, 275, 285 ff., 289, 356
 Hymir, 368
 Hyperboreans, 265
 Hyperion, 260
 Hypogeic geology, 7, 75
 Hypsometric hypothesis, 101 ff.
 Hyrroken, 370

 Iapetos, the god, 260
 Iapetos, the satellite, 32
 Iblis, 147
 Icarus, 272-273
 Ice ages, see Glaciation in remote ages, 14, 15, 43, 48, 50, 78-79, 80 ff., 94 ff., 98, 101 ff., 112 ff., 124 ff., 147, 178, 299, 351, 373, 382, 385
 Ice recession, 109, 124-142
 Ida, 259, 386
 Idun, 290, 374, 375
 Ilhataina, 327
 Ilus, 257
 Impregnated water, 53, 63
 Indian myths, see Amerind myths
 Indra, 153, 174, 175-176, 177, 178, 184, 185, 249, 256, 335, 354
 Ino, 280
 Inundation mud, 48-49
 Inverted world, 224, 237-238
 Iolans, 275
 Irin Magé, 380
 Iroquoian myths, 149, 309, 328
 Irradiation, 353
 Isfendiyar, 292
 Ishtar, 164, 199, 209, 211, 212, 215, 218, 249, 285
 Isis, 221, 222, 224-225, 357, 369, 375
 Island, see Egg-land.
 Island of the Innocent, see Egg-land, 242, 263

- Isle of Ogygia, see Egg-land, 170
 Isles of the Blessed, see Egg-land, 242, 247, 250, 304
 Isostasy, see Weight of ice, 43, 93 ff., 119, 120, 121 ff.
 Ivan, 153, 279, 332-356
 Izdubar, 211
 Izanagi, 360

 Jack of the Bean-Stalk, 312
 Jacob's ladder, 163, 262
 Japanese myths, 165, 360
 Japetus, 260
 Jasher, 235
 Jaw, 204-205, 313, 337, 355, 375, 385
 Jonah, 378
 Joshua's long day, 158, 173, 235
 Jötun, 367
 Jötunheim, 362
 Jove, 153, 177, 223, 228, 231, 261, 275, 308
 Juggernaut, 356
 Juno, see Hera, 147, 233, 261, 271, 272, 275, 278
 Jupiter, the god, see Zeus, 209, 229, 255, 259, 261, 271, 287
 Jupiter's system, 6, 16, 30, 34, 35, 36-37, 38, 39, 72, 371, 380

 Ka, 239, 261
 Kaffirs, 168
 Kahit Kiemila, 323, 324
 Kaltsauna, 326
 Kames, 127, 130
 Karens, 280, 316
 Katkatchila, 321, 322
 Khem, 221
 Khepra, 220
 Khonsu, 221
 Kishma, 368
 Kiss Miklos, 335 ff., 346 ff.
 Kneph, 221
 Kootenays, 317
 Koshchéi, 153, 335, 338, 340 ff., 346, 350, 351
 Krakatoa, 17, 24, 360-361
 Ku-Meru, 187
 Kwasind, 235

 Labyrinth, 271-273
 Ladon, 290
 Lake filling, 127-128, 130
 Lake Llion, 267
 Land bridges, 5-6, 43, 63, 92, 94, 95, 96 ff., 99, 134, 135
 Laramide, 59
 Latona, 265, 266, 268, 271

 Lead Friend, 337-338
 Lenapé, 162-163
 Leto, see Latona, 271
 Leviathan, 152, 198
 Lexell's comet, 35
 Lias, 54, 55, 125
 Light dispensed with by plant-life, 21-22, 73, 96, by animals, 73
 Light One, 318
 Limitations of ice, 107-108, 112-113
 Linguistic measles, 168-169
 Lion-snake, 154
 Litaolane, 316
 Lithological record, 50
 Load, see Weight of ice, 121
 Loess, 46-47, 48-49
 Lohengrin, 252-253
 Loke, Lok, Loki, 290, 362, 369, 370, 371, 372, 373, 374, 384, 385, 386
 Longevity, 162, 233
 Lot, 214
 Lower Carboniferous, 62
 Lower Cretaceous, 67
 Lower Silurian, 51, 59, 61
 Lower world, 344 ff.
 Lutchi, 323, 326

 Maane, 369
 Machito, 268-269
 Magna Mater, see Mother, 260, 278
 Mammoth, 54, 68, 78, 111, 112, 138, 371
 Mammoth age, 47
 Manabozho, 316
 Mandara, 196
 Manes, Menes, Menos, Minyas, 250
 Manitu, 162, 235
 Man's relics, see Archæology, 132-142
 Manu, 193, 194, 211, 250
 Maoris, 168, 178-181
 Marduk, 197, 202, 203, 204, 205, 206, 207, 209, 210, 211, 368
 Mars, 34, 38, 39, 209, 288
 Maruts, 177-178
 Mathematical calculation, stability of rings, 30-32, 41
 Mani, 280, 313, 314
 Maut, 221
 Maw, see Clam and Jaw, 233, 260, 316
 Medusa, 351
 Melusina, 352
 Mem Loimis, 323, 324
 Mentu, 220
 Mercury, 209, 378
 Meru, Mero, Merou, Meropes 187-188, 263, 264
 Mesozoic, 41, 53, 59, 67, 71, 98

- Meteoric falls, 29, 33, 34, 35
 Meteoric hypothesis, 34, 41
 Methuselah, 162
 Metis, 259
 Mexican myths, 151, 154, 243, 245, 317-318, 357, 381, 383
 Michabo, 318, 327
 Middle heaven, 148, 289
 Middle world, 148, 291
 Midgard Serpent, 148, 152, 326, 328, 357, 362, 367, 368, 371, 382, 384, 385
 Midgard world, 362
 Migrations, 43, 49, 63, 96-97, 103 ff., 110 ff., 115, 134, 140, 166
 Miklos, 335 ff.
 Mile-deep, 368
 Mimir, 366
 Mimir's Realm, 363, 366
 Minerva, 261, 262
 Minos, 272 ff.
 Minotaur, 273
 Miocene system, 68, 81, 84, 85, 90
 Mirko, 343 ff.
 Missing links, 53, 66 ff.
 Miztecs, 154
 Mjolner, 367
 Mock suns, see Halo-boats, 170, 263, 356
 Modern storm, see Hydra, 178-182, 261-262, 356
 Mogol bird, 339
 Mohammedan myths, 196, 251
 Monan, 379-380
 Monstrous growths, 67-71
 Moon, canopy disk, 158, 159, 203, 214-215, 227, 287, 306, 360, 369, 372, 373
 Moon, origin of, 40-41, 45
 Moongarm, 372
 Morgan le Fay, 293-294
 Moses, 172, 216
 Mot, 257
 Mother, 199, 205, 210, 211, 248, 249, 260, 285, 359, 363, 366
 Mound Builders, 148, 149, 243 ff.
 Mount Pelée, 17
 Mountains, 151, 158, 163, 171, 187-188, 194, 196 ff., 203, 210, 213, 214, 217, 223, 233, 236 ff., 247 ff., 259 ff., 279, 287, 289, 304, 312, 316, 331, 342, 343, 345, 348, 365, 370, 374, 381, 382
 Mundilfare, 369
 Muses, 272
 Muspelheim, 363, 379, 384
 Mutation theory, 60, 61, 63-64, 71, 89, 125
 Mystery of good and evil, 160-161, 162-163, 169-170, 172 ff., 376-378
 Nabu, 203, 209, 217
 Nagalfar, 371
 Nanahuatzin, 318
 Nannar, 215
 Natural preservation, 64, 68
 Natural selection, 66
 Navajos, 315
 Nebo, 196
 Nebulæ, 34-35
 Nebular hypothesis, 7-8, 44, 45, 75
 Nekilstluss, 310
 Nemean lion, 164, 170, 280, 285, 327, 369
 Neolithic relics, 134, 137, 138, 141
 Nephthys, 225
 Neptune, see Poseidon, 153, 287, 288
 Neptune, the planet, 38, 39
 Nergal, 209
 New Zealand myths, 178-181, 238-239
 Niagara gorge, 128 ff., 132, 133
 Nicholas, 336 ff., 343
 Niflheim, 363
 Night, 183-184, 185, 237-239, 257
 Night, canopy darkness, 153, 335
 Nin-gal, 203
 Nin-girsu, 203, 215, 246
 Nin-gish-zidu, 215
 Ninib, 196, 203, 209, 215, 216, 217
 Nin-lil, 203
 Nin-shaka-kuddu, 215
 Nin-shakh, 215
 Noachian flood, 48, 54, 165, 166, 173, 193, 211, 214 ff., 229, 308, 377, 379 ff.
 Noah, 161-162, 192, 193, 214, 287, 378
 Norka, 153, 335, 339
 Nox, 257
 Nubi, 227
 Nu-t, 145, 146, 176, 226, 247 ff., 260, 273
 Nymphs, 189, 259, 274, 375
 Oannes, 255
 Oceanides, 260
 Ocean-river, 146, 188, 200 ff., 242, 246, 250, 258, 260, 265, 297 ff., 362
 Oceanus, 260
 Odin, 264, 359, 361, 365, 366, 373, 385, 386
 Odysseus, 170, 280, 293
 Oedipus, see Crab, 233 ff., 287, 374
 Ogygia, 170, 287
 Ojibway legends, 264, 311, 313
 Old Red Sandstone, 56
 Ollebis, 319 ff.
 Ollephanti, 320 ff.
 Olger, 293
 Olympus, 151, 163, 196, 228, 233-234, 254, 260 ff., 272, 320
 Ombo, 227
 Omoroka, 204

- Oolite, 58, 125
 Open zones, 20, 51, 73, 103, 104 ff., 119
 Oracles, 231-232, 254, 259, 262, 272
 Ordovician, 80
 Orientation, 240 ff.
 Original sin, 161, 163, 169-170
 Origin of satellites, 35-36, 38, 39, 40, 41, 45
 Origin of species, 73
 Origin of the Greek gods, 255
 Orizaba, 151, 383
 Ormuzd, 328
 Orographic movements, see Sympathetic earth movements, 59
 Orpheus, 257
 Orthus, 274, 285
 Osiris, 153, 220, 221, 222, 223, 224-225, 226, 227, 236, 238, 273, 277, 311, 316, 318, 369, 375
 Ossa, 163, 260 ff.
 Oxen, see Bull, Cows, etc., 270, 289
 Oxen of Geryon, 234, 242
 Oxygenation, 69
 Oyster canopy, 258
- Pákchuso, 323
 Palæocosmic age, 47, 48
 Paleolithic relics, 128, 133, 134, 137, 138, 141, 166
 Paleozoic, 53, 59, 77, 80, 86, 90, 98
 Pallas Athene, 261 262, 271, 274, 275
 Pani robbers, 184
 Pan-ku, 268
 Papa, 178-181
 Paradise, 246, 364, 365
 Parjanya, 176
 Parnapistim, 214 ff.
 Parnassus, 272, 287
 Peerless Beauty, 338 ff., 346
 Pegasus, 231, 273 ff.
 Pelion, Mount, 163, 260
 Penelope, 281
 Peneus, 260
 Percival, 252
 Period of rotation, 36-38
 Permian, 77, 79, 80, 81, 86, 99, 102, 118, 119
 Perseus, 185, 277, 282, 292, 311
 Persian legends, 147, 154, 291 ff., 356, 369
 Perun, 153, 335
 Peruvian myths, 148, 245, 266, 314, 316-317, 357
 Phædo myth, 304 ff.
 Phædrus myth, 304 ff.
 Phaeton, 219, 228-231, 263, 322, 372
 Phenomena due to remnants of vapor-belt, 22, 24, 27-29
 Philistines 177, 213, 277
- Phobos, satellite of Mars, 38
 Phœbus, see Apollo, 231, 272, 282
 Phœnician myths, 163-164, 185, 225, 257, 276
 Phthah, 221, 250
 Piguerao, 317
 Pillar of cloud, 173, 183-184
 Pillars of Hercules, 145-146, 163, 169, 177, 207, 208, 213, 214, 222, 225, 264, 276, 302, 360, 382
 Planetesimal deposits, 39, 44-45, 47, 71, 75, 361
 Planetesimal hypothesis, 7-8, 16, 30 ff., 34, 40
 Pleistocene, see Ice ages, 47, 81, 85, 112, 116, 120, 124
 Pliocene, 84, 85
 Pluto, 304, 369
 Poháramas, 322
 Pohila, 322
 Poisoned air, see Carbon dioxide in atmosphere, 267, 385
 Pokaila, 281, 323
 Politicus myth, 299 ff.
 Polydectes, 277
 Polynesian myths, 165, 178-181, 313, 314
 Pontus, 258
 Poseidon, see Neptune, 153, 254, 288, 376
 Post-Cretaceous, 59
 Post-Pliocene, 6, 71, 82
 Post-Tertiary, 85
 Precession of the equinoxes, 93, 99, 101, 115-116, 124
 Precipitation, 103-104, 119
 Pricni, 177
 Prince of Tyre, 171-172
 Prometheus, 271, 285, 300, 326
 Psyche, 253
 Ptah, 248, 250
 Ptolemy's rings, 169, 256
 Pueblos, 315
 Pu-keh-eh, 328-330
 Punctuation of geological time, 3, 31, 35, 49-51, 52, 59-60
 Pururavas, 187, 253
 Pyramids, see Shadow-mountain, 158, 173, 196, 236, 239 ff., 242 ff., 376
 Pythias, 258, 313
 Python, 262, 272
- Quaternary period, 81, 95, 99, 120, 131
 Quetzalcoatl, 150, 151, 192, 243, 281, 383
 Quiches, 150, 190 ff., 222, 270, 309, 319
 Quiescent state of nature, 60, 64, 66
- Ra, 220, 227, 248, 250, 273, 276, 313, 378, 379

- Ragnarok, 124, 322, 351, 358-386
 Rainbow, 173, 385
 Raised beaches, 92-93
 Rakshaas, 276, 378
 Rama, 263-264, 276, 286, 313, 378, 379
 Ramman, 217, 264
 Rangî, 178-181
 Rapid suns, 151, 152, 171, 182, 186, 211, 230, 231, 274, 304 ff., 319, 372
 Râtri, 183
 Ravana, 276, 286, 290, 378, 379
 Raven, 261, 317, 350
 Rayless one, 154, 317
 Recent submergence, see Noachian flood
 Red beds, 47, 119
 Reindeer age, 47, 77, 137
 Remnants of the zonal belt, 22-23, 27-29, 32, 124
 Reptilian age, 41, 73
 Retrograde motion, see Crab, Slow-foot, Swollen-foot, and Œdipus, 286, 300-301
 Retrograde satellites, 38
 Rhea, 258 ff.
 Rigidity of earth, 42
 Ringhorn, 370, 371
 Rip Van Winkle, 293
 Ritual, see Book of the Dead, 223-224, 237-238, 247
 Roc, 70, 291
 Rock-flowage, see Sympathetic earth movements, 42
 Roland, 283, 291 ff.
 Roof of heaven, 305
 Rubble-drift, 46, 165
 Rupture of the canopy, 12, 13, 16, 23-24, 97-98
 Russian tales, 153, 168, 279-280, 332-357, 370
 Rustam, 234, 291 ff.

 Saint George, 153, 185, 186, 328, 337, 356
 Samson, 163-164, 177, 213, 313, 378
 Sani, 147
 Sanskrit, 168, 175
 Sar, 237
 Saramâ, 184
 Sas, 282 ff.
 Saturn, 39, 209
 Saturn's ring system, 4, 6-7, 8, 16, 29, 30, 31 ff., 33, 34, 35, 37, 72, 147, 158-159, 232
 Savitri, 182, 186, 187, 230
 Saxon legends, 153
 Scandinavian myths, 152, 177, 196, 205, 226, 250, 256, 264, 290, 292, 313, 322, 341, 358-386
 Scorpion-men, 213 ff.
 Scripture texts, 173

 Seylla, 285
 Seasons, alternating, 50-51, 97-98, 103, 154
 Seb, see Set, 145, 153, 227, 247, 369, 384
 Sebastian of Portugal, 294
 Secondary cloud-system, 7, 16, 19 ff., 23-24, 30 ff., 37, 103 ff., 145-146, 157, 202-204, 260-261, 360 ff.
 Sediments, 44, 61, 127, 369
 Sedit, 326
 Selective absorption, 19-22, 53, 72
 Selene, 260
 Serpent, 19-20, 24, 141-142, 143, 145-154, 160, 162, 163, 169, 172, 173, 175, 176, 177, 185, 188-189, 195-196, 198, 204-207, 211, 213, 225, 226, 237, 248, 262-264, 267, 272, 274, 277, 279, 284, 289-291, 298, 326, 328, 332 ff., 338, 339, 350, 351, 353 ff., 365, 367, 368, 370, 371, 376, 378, 382
 Set, 221, 225-227, 247, 369, 384
 Seven, significance of, 85, 212, 233, 246, 271
 Shadow-mountain, see Pyramid, 158, 159, 173, 236-239, 376
 Shamash, 145, 164, 196, 203, 213, 214, 217, 278, 279
 Sharru, 217
 Shifting of the waters, 40-43, 54
 Shiner, 144, 150, 158, 173, 186, 187, 215, 227, 231, 235, 250, 278, 316, 326, 328, 349, 359, 360, 361, 366 368
 Ships, 203, 370-371
 Shoshone Indians, 286
 Shrinkage hypothesis, 11
 Shu, 220
 Siegfried, 234, 292, 383
 Sif, 372
 Signs of the zodiac, 210
 Sigurd, 185, 292
 Silfrintop, 361
 Silurian, 49, 51, 52, 86
 Silver age, 307
 Silver bridge, 336, 343
 Silver ring, 339
 Simultaneous appearance, see Suddenness, 60 ff.
 Sin, 196, 203, 214, 215
 Sippara, 144
 Siriwit, 320
 Sita, 286, 378, 379
 Siva, 250, 368, 369
 Skeidbrimer, 361
 Skeletons not adapted to environment, 68
 Skidblader, 371
 Sleipnir, 361, 369
 Slow-foot, see Œdipus, 233-234, 374

- Smoking mirror, 150
 Sol, 228, 288, 369
 Solar climate, 50-51, 97-98, 103
 South African myths, 310
 Spectra, 22, 37, 63, 72, 232
 Sphinx, 213, 233, 236, 285
 Spindle of Necessity, 298 ff.
 Spiral nebula, 34
 Stag, 287-288
 Star-eyes, see Golden apples, 170, 323
 Stone age, 47, 134, 138, 139
 Stratagraphic record, 49-50
 Streams, sky, 188-189, 200-202, 297-298, 366-367, 369
 Stymphalides birds, 287
 Styx, 264, 298
 Submergence, recent, see Noachian Flood, 43, 48, 93, 99, 165, 166
 Suddenness in the appearance of species, 59, 60 ff., 65, 157, 165-166
 Suddenness of extinction, 48, 52, 54 ff., 67, 111-112, 119, 166
 Su-Meru, 187
 Supchit, 284
 Surt, 363, 369, 384
 Surtur, 385
 Survival of the fittest, 63-64, 67
 Sūrya, 187
 Susa-noO, 360
 Sutekh, 227
 Sutunut, 323
 "Swift," 231, 321
 Swollen-foot, see Œdipus, 233 ff.
 Sympathetic earth movements, 42, 59, 63, 75, 122-123, 152, 287, 299, 381-382, 384
 Sympathetic glaciation, 113, 114, 118
 Symplēgades, 280
 Symposium myths, 306 ff.
 Synthetical work, 155
- Tamheur, 317
 Tammuz, 169, 212, 322, 370
 Tane-mahuta, 179-181
 Tangaroa, 180
 Tannhäuser, 294
 Tara, 277
 Tartarian pall, 258
 Tartarus, 224, 237, 260, 298
 Ta-vi, 227
 Ta-wats, 227-228, 313
 Tawhiri-ma-tea, 178-181
 Temperature, narrowness of range, 11, 73-74, 77
 Temple, sky, 164, 272
 Temples, Babylonian, 45-46
 Tertiary, 53, 62, 67, 81, 83, 84, 89, 90, 91, 95-96
- Teta, 247
 Texts, Scripture, 173
 Tezcatlipoca, 150, 151, 267
 Tezpi, 192
 Thebes, 233, 307
 Themis, 271
 Theogony, 151, 326, 359
 Theoktony, 124, 223, 308, 359
 Theseus, 273, 282, 295
 Thjasse, 290, 374
 Thlinkets, 258, 269, 311
 Thor, 177, 328, 335, 354, 362, 366, 367, 368, 370, 385, 386
 Thoth, 221
 Thrym, 367
 Thunderer, 177, 217, 219, 226, 228, 231, 261, 262, 327, 328, 350, 362, 366, 368, 375, 381, 385
 Tiāmat, 204, 205, 206, 207, 210, 211, 368
 Tidal retardation, 36, 39, 40 ff., 63
 Tiger-snake, 154
 Tilikus, 322
 Timadonar, 153
 Timæus myth, 301 ff.
 Time-clock, geological, 11, 35, 39, 41, 49 ff., 52, 382
 Titans, 167, 250, 259 ff., 271, 367
 Titchelis, 322
 Tochopa, 328 ff.
 Toltec myths, 150, 151, 382
 Treasures of snow, 173
 Tree, see World tree, and Ygdrasil, 163, 225, 226, 255, 290, 364-365, 375 ff., 378
 Triassic, 41
 Trolls, 341, 342
 Tsawadi Kamshupa, 327
 Tubal-Cain, 378
 Tulchuherris, 281 ff.
 Tum, 220
 Tu-ma-tauenga, 178, 180
 Turtle, 149, 257
 Twa Wya, 316
 Twilight, see Ragnarok, 322, 359, 373, 374, 384
 Two Truths, see Hall of, 222 ff., 226
 Typhon, 152, 153, 224-225, 226, 227, 232, 236, 247, 274, 285, 375
 Tyr, 371, 372, 386
 Tyre, Prince of, 171-172, 173
- Ukk's fiery shirt, 280
 Underground kingdom, 332
 Underworld, 201, 224, 237-239, 259
 Undine, 253
 Unglaciaded regions, 112-113
 Upper Cretaceous, 84
 Upper Silurian, 59, 61

- Uranus, the god, 255, 258, 260
 Uranus, the planet, 38, 39
 Urd, 363
 Uru, 278
 Urvasi, 253
 Usuinia Bird, 339, 351
 Ute, 227-228
 Utgard-Loki, see Loke, 362

 Vagin, 186, 230
 Val, see Vritra, 185
 Valhalla, see Walhalla, 383, 384
 Vali, 369
 Valkyries, 383
 Vanir, 363
 Vanirheim, 363
 Varuna, 144, 174, 175, 176, 177, 182, 188,
 249, 255, 256, 375
 Vassilissa, 351
 Vâsuki, 195
 Vault of heaven, 144, 174
 Venus, the goddess, 261, 294
 Venus, the planet, 34, 35, 209
 Vertodub, 348
 Vertogor, 348
 Vidar, 385, 386
 Vishnu, 188-189, 193-195, 211, 247, 287,
 368
 Voice of waters, 173
 Volcanic action, sympathetic, 54, 63, 119
 ff., 122 ff., 166
 Volcanic ejections, 16, 17 ff., 22 24 ff., 29,
 33, 34
 Vritra, 153, 177, 185
 Vulcan, 234, 271, 378

 Waida Werris, 324, 372
 Wakpohas, 323
 Walhalla, 370, 383, 384
 Wallapais, 330
 Walskit, 327
 Warlock, 342
 Waters of Life and Death, 279
 Waves of translation, 42, 47-48

 Weight of atmosphere, 53, 63, 69, 122-123
 Weight of ice, 43, 93 ff., 119, 120 ff., 165
 Wheels, 171, 173, 211, 249, 263
 White One, 149, 151, 318, 319
 White World, 332
 Wima Loimis, 327
 Winged sun, 151, 152, 171, 174, 182, 186,
 215, 219-220, 230, 231, 274, 304 ff., 319,
 372
 Wintu, 285, 319 ff., 327
 Wisdom, see Oracles, and Mystery of good
 and evil, 262
 Witch-snake, 213, 342, 344-345, 346, 348
 ff., 383
 Withdrawal of ice, 125 ff.
 Wokwuk, 324
 World-roof, 147, 315, 352
 World-tree, see Ygdrasil, 146, 226, 255,
 264, 289, 348, 364-365, 376, 378, 384,
 385
 Wyandots, 312, 313

 Xecotcovach, 309

 Yama myths, 285
 Yama's realm, 182, 187, 250
 Yana myths, 326-327
 Yehl, 258, 269, 311
 Yelena the Wise, 332 ff., 349
 Ygdrasil see World-tree, 153, 226, 264,
 281, 363, 364, 367, 376
 Ymer, 256-257, 264
 Yonot, 322
 Yudo, 351, 356

 Zas, 280-281
 Zeus, see Dyaus and Jupiter, 175, 235,
 250, 254-255, 259, 260, 265, 271, 280,
 289, 300, 301, 304, 307, 318, 326, 364,
 371
 Zikkurats, 196 ff., 245 ff.
 Zméi Goruinuich, 351
 Zohak, 147
 Zoroaster, 141, 142
 Zulus, 316





RETURN
TO →

EARTH SCIENCES LIBRARY

642-2997

LOAN PERIOD 1 1 MONTH	2	3
4	5	6

ALL BOOKS MAY BE RECALLED AFTER 7 DAYS

Books needed for class reserve are subject to immediate recall

DUE AS STAMPED BELOW

302

Storage

U.C. BERKELEY LIBRARIES



C034633387

